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Engraved by W. H. Cox from a photograph by Elliott & Fry

The Author
in his robes as Doctor in Science
University of Cambridge

SUPPLEMENT

TO THE

'BIRDS OF NEW ZEALAND.'

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&c., &c., &c.

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Dedication.

THIS SUPPLEMENT

TO THE

'BIRDS OF NEW ZEALAND'

I affectionately Dedicate

TO MY DAUGHTER

LAURA

(NOW THE WIFE OF BREVET-MAJOR W. R. N. MADOCKS,
ROYAL FIELD ARTILLERY),

WHO WAS MY CONSTANT COMPANION DURING ITS PREPARATION,
AND HAS CONTRIBUTED SOME BEAUTIFUL PHOTOGRAPHS
OF NEW ZEALAND SCENERY TO ITS PAGES.

LIST OF ILLUSTRATIONS.

VOL. I.

COLOURED PLATES.

TEXT ILLUSTRATIONS.

TYPOGRAPHICAL CORRECTIONS.

The caption, page 97 : for Family PUFFINIDÆ read Family PROCELLARIIDÆ.
„ „ pages 112 and 120 : for Family PROCELLARIIDÆ read Family PUFFINIDÆ.
„ „ page 172 : for Family STERCORARIIDÆ read Family CHARADRIIDÆ.

PREFACE.

SEVENTEEN years have now elapsed since the publication of my Second Edition of the 'Birds of New Zealand.' During that period several new and interesting species have been discovered, a number of wanderers or stragglers, from Australia and elsewhere, have been detected on our shores, and much detailed information, more or less important, has been obtained respecting most, if not all, of the species described in that work. I have thought it better, instead of bringing out a new edition of so expensive a book, to issue a Supplement of two volumes, conforming in their style and appearance to the original Vols. I. and II., in which all this new material will be embodied, and coloured illustrations given of species not figured in the former volumes. I have taken this opportunity of re-classifying the avifauna of New Zealand according to the most modern system of arrangement, namely that adopted by Dr. Bowdler Sharpe in his recently published 'Handlist of Birds'; so that, although in the nature of a 'Supplement' forming, as it were, a necessary acquisition for those who possess my former work, the present publication is virtually complete in itself, embracing all the known species.

I am aware that Dr. Sharpe's system, which reverses the old sequence and commences with the lowest instead of the highest forms, has challenged much criticism; but the fact remains that it has been adopted by the Trustees of our National Collection as the best that can be devised, whilst it seems to have met with general acceptance on the Continent. All systems are confessedly artificial, and they must in a sense be provisional, whilst our knowledge of the Science is advancing towards perfection; but, for my own part, I attach so much importance to securing uniformity that, in my opinion, this is enough to outweigh all other considerations. It is to be hoped that we have now reached something like finality in the nomenclature of the birds of New Zealand, which has undergone many violent changes since the publication of my first edition in 1873. In the placing of the genera, and of the species, as far as possible, the sequence followed is that of the 'Handlist.'

As with the First and Second Editions, so with the present work, I have had the advantage of Mr. Keulemans' unrivalled pencil. Those who are familiar with the life-work of that talented artist will, I think, admit that he has never produced more beautiful or life-like Bird-pictures than those which appear in the present volumes. And I feel that I cannot give too much praise to my printers, Messrs. John Bale, Sons and Danielsson, Limited, for the manner in which they have carried out their work, including also the production of the numerous process-blocks in their Art Department, and the printing of the plates, for hand-colouring. Lastly, my thanks are due to my excellent correspondents in New Zealand who have kept me posted in everything of interest relating to the native birds.

London, March, 1905.

INTRODUCTION.

In my General Introduction (vol. i., pp. xviii. to lviii.) I have dealt so fully with the distinguishing features of the New Zealand Ornis that I do not propose to do more now than to offer some remarks and observations suggested by a general purview of the subject, and principally in relation to certain facts and inferences that appear to me to bear directly on the great doctrine of the evolution of species by a natural process of descent with modification—that is to say, the ever-operating law of natural selection by variation and the survival of the fittest. The views which I shall here elaborate have already appeared in my paper entitled 'Illustrations of Darwinism'* ('Trans. N.Z. Inst.,' 1895, vol. xxvii., pp. 75-104), and I take this opportunity of revising and amplifying them, so as to bring them down to date.

The ornithology of New Zealand, apart from its intrinsic interest, presents to the thoughtful naturalist several aspects of great philosophical significance. Not the least of these is that of the many peculiar forms which it contains, and their local distribution, because of the remarkable evidence hereby furnished in support of the now generally accepted Darwinian theory of the creation of species in the organic world—that is to say, by a natural and gradual modification of character, due to the survival of the fittest in the universal struggle for existence.

The principle of natural selection is expressed by Darwin himself as that of "the preservation during the battle of life of varieties which possess any advantages in structure, constitution, or instinct." He says, and with great force: "In scientific investigations it is permitted to

* This paper, reprinted in pamphlet form, was sent to Sir Joseph Hooker, amongst other scientific friends, and I had the pleasure of receiving the following letter of acknowledgment from that distinguished naturalist:—

"My dear Buller,

"Yesterday I received yours of 10th May [1895], and this morning your 'Illustrations of Darwinism.' Such is my avidity for anything relating to the natural history of New Zealand that I read your papers through at once and with very great pleasure. They reminded one of 'White's Selborne' and interested me exceedingly. I go along with you throughout the Darwinism discussion, especially with regard to so-called degraded types being in reality advanced ones. . . . .

"How profoundly interesting is the islet fauna of New Zealand! Much of this is new to me. I wonder when their plants will receive the same treatment as you give to their birds, &c. I hope that you will gather your facts into a general work on the natural history of New Zealand. Your difficulty will then be to keep it down to a moderate size, especially as I hope you will illustrate plentifully. A good map will be necessary, as it is impossible to find in the ordinary ones many of the places you mention. . . . ."

To my mind Sir Joseph Hooker could not have paid a higher compliment to the literary quality of these papers. From boyhood White's 'Natural History of Selborne' has been one of my favourite books, as I suppose it has been with every student of ornithology. It is thus referred to by the learned author of the article on Ornithology in the 'Encyclopædia Britannica': "It has passed through a far greater number of editions than any other work on natural history in the whole world, and has become emphatically an English classic, the graceful simplicity of its style, the elevating tone of its spirit, and the sympathetic chords it strikes recommending it to every lover of Nature, while the strictly scientific reader can find few errors in the statements it contains, whether of matter of fact or opinion. It is almost certain that more than half the zoologists of the British Islands for the past seventy years or more have been infected with their love of the study by Gilbert White, and it can hardly be supposed that his influence will cease."

invent any hypothesis, and if it explains various large and independent masses of facts it rises to the rank of a well-grounded theory. . . . If the principle of natural selection does explain these and other large bodies of facts, it ought to be received. On the ordinary view of each species having been independently created we gain no scientific explanation of any one of these facts. We can only say that it has so pleased the Creator to command that the past and present inhabitants of the world should appear in a certain order and in certain areas; that He has impressed on them the most extraordinary resemblances, and has classed them in groups subordinate to groups. But by such statements we gain no new knowledge; we do not connect together facts and laws; we explain nothing."* In his 'Origin of Species' Mr. Darwin has shown that all organic beings, without exception, tend to increase at a very high ratio, and that the inevitable result is an ever-recurrent struggle for existence, in the natural course of which the strongest ultimately prevail and the weakest fail. By this process those variations, however slight, which are favourable are preserved or selected, and those which are unfavourable are destroyed. This continued production of new forms through natural selection inevitably leads to the extermination of the older and less improved forms, these latter being necessarily intermediate in structure, as well as in descent, between the last-produced forms and their original parent species. The position to which this brings us is thus stated: "Now, if we suppose a species to produce two or more varieties, and these in the course of time to produce other varieties, the principle of good being derived from diversification of structure will generally lead to the preservation of the most divergent varieties; thus the lesser differences characteristic of varieties come to be augmented into the greater differences characteristic of species, and, by the extermination of the older intermediate forms, new species end by being distinctly defined objects. Thus, also, we shall see how it is that organic beings can be classed by what is called a natural method in distinct groups—species under genera, and genera under families." Following the subject up with consummate skill, and bringing together a marvellous array of facts and observations, Darwin has shown very conclusively that descent with modification has been from time immemorial the means, whether naturally or artificially it matters not, of producing new and distinct forms of animal and vegetable life. The subject is on the face of it a very attractive one, and, when we come to deal with the actual facts, there is room for almost endless speculation in all directions. But what I propose to do now is to single out some well-established features and peculiarities of the New Zealand avifauna, to which, as most of my readers are aware, I have for many years given special attention, and to consider their direct bearing on the theory of evolution, or, putting it the other way about, to endeavour to find in the Darwinian doctrine of natural development their true and rational explanation.†

* 'The Variations of Animals and Plants under Domestication,' 2nd ed., vol. i., page 9.

† "The theory of evolution was started as an hypothesis by Buffon, and defended and modified by Lamarck and others, but was regarded by most scientific men as a wild dream, until Darwin and Wallace, after years of patient accumulation of materials, overwhelmed the learned world with such a vast array of facts that with scarcely an exception scientific men acknowledged their defeat, and the hypothesis of evolution was raised to the rank of a theory as firmly based on facts as Newton's theory of gravitation, or the undulatory theory of light. . . . . The great charm of Darwin's theory of natural selection is its simplicity. The theory of evolution by descent with modification had a great deal to recommend it; but the difficulty always presented itself, By what possible machinery could it be worked? To suppose a special creation of every species was bad enough, and looked weak, as if the clock always wanted mending or altering to make it go right. But to suppose not precisely a special creation, but a special interference, in a given direction, with the law of *like producing like*, at every generation, was a thousand times worse; and, consequently, of two evils scientific men chose the least, and the theory of evolution was laid on the shelf until Charles Darwin and Wallace took it down again. The fact of the survival of the fittest in the struggle for existence is such a simple theory that a child can understand it; and not only the scientific world, but almost every educated man, accepted the new theory of evolution as soon as they saw—or thought they saw—the simplicity of the machinery by which it is worked."—*Seebohm*.

Perhaps there is no country in the world where the process of natural selection among birds has had so favourable a field for its operation as New Zealand, owing to its great age as a continental island, and to the entire absence of natural enemies, up to the time, at any rate, of its occupation by man and the introduction of domestic animals which afterwards became feral. As a result, what do we find here as representing the ancient order of Palæognathic birds? I will not refer at present to the Moa and its kindred, because these birds have become extinct, and, except by way of analogy, do not come into my present subject. But look at the genus Apteryx, taking, for illustration, the oldest known member of the genus, *A. australis*. Here is a bird with, so to speak, the body of a Turkey and the wings of a Sparrow, these limbs having become so dwarfed by the operation of natural laws that they are reduced to mere rudiments; yet all the muscular parts, aborted and atrophied though they be, become perfectly distinct under the dissecting knife. Unlike all other known birds, instead of having the nostrils placed in the nasal groove, or on the ridge of the bill (as in the Petrel family), they are situate under a terminal protuberance at the extreme end of the upper mandible; and, on examination, it is seen that the produced upper mandible is in reality a prolongation of the facial bones—the result, no doubt, of long-continued gradual development in that direction—the brain being pushed back, as it were, into a cranial pan comparatively small for the size of the bird. These modifications of structure are of course adaptations to the feeding habits of the bird, which subsists principally on earthworms, in search of which, aided by its power of smell, it probes the soft ground or loose vegetable mould in its forest haunts. In addition to this the head is furnished with long rictal hairs or feelers, as sensitive as the whiskers of a cat, and its hearing is known to be marvellously acute.

Mr. Alfred Russel Wallace, in his admirable work on 'Darwinism,' says (at page 114): "So soon, however, as we approach the higher and more fully developed groups, we see indications of the often-repeated extinction of lower by higher forms. This is shown by the great gaps that separate the mammalia, birds, reptiles, and fishes from each other; whilst the lowest forms of each are always few in number and confined to limited areas. Such are the lowest mammals—the Echidna and Ornithorhynchus of Australia; the lowest birds—the Apteryx of New Zealand and the Cassowaries of the New Guinea region; while the lowest fish—the Amphioxus or lancelet—is completely isolated, and has apparently survived only by its habit of burrowing in the sand. The great distinctness of the carnivora, ruminants, rodents, whales, bats, and other Orders of Mammalia: of the Accipitres, Pigeons, and Parrots, among birds; and of the beetles, bees, flies, and moths, among insects, all indicate an enormous amount of extinction among the comparatively low forms by which, on any theory of evolution, these higher and more specialised groups must have been preceded."

Now, whilst accepting Mr. Wallace's general argument and admitting its soundness, I must venture to differ entirely with that distinguished observer as to the position assigned to the genus Apteryx. I cannot for a moment admit that the Kiwi is one of the lowest birds in the sense implied. It rather seems to me to be an extremely specialised form, and one to which Mr. Wallace's own felicitous remarks (at page 105) are specially applicable: "In species which have a wide range, the struggle for existence will often cause some individuals or groups of individuals to adopt new habits, in order to seize upon vacant places in nature where the struggle is less severe. Some, living amongst extensive marshes, may adopt a more aquatic mode of life; others, living where forests abound, may become more arboreal. In either case we cannot doubt that the changes of structure needed to adapt them to their new habits would soon be brought about, because we know that variations in all the external organs and all their separate parts are very abundant and are also considerable in amount. That such divergence of character has actually occurred we have some direct evidence." By way of

illustration, Mr. Wallace reminds us that Madeira, like many other oceanic islands in the temperate zone, is much exposed to sudden gusts of wind, and that, as most of the fertile land is on the coast, insects which flew much would be very liable to be blown out to sea and lost. Year after year, therefore, those individuals which had shorter wings, or which used them least, were preserved; till in process of time, as we now see, the insects of Madeira have become wingless and terrestrial, or, if they have not entirely lost their wings, have had them so reduced as to be useless for flight. To my mind it would not be right to confound these wingless insects with the lower forms of the "more generalised ancestors," but rather to assign them a place among the "higher and more specialised groups." For it must be borne in mind that, as Mr. Wallace himself expresses it (page 120), the "remarkable advance in the higher and larger groups does not imply any universal law of progress in organisation, because we have, at the same time, numerous examples of the persistence of lowly-organised forms, and also of absolute degradation or degeneration. Serpents, for example, have been developed from some lizard-like type which has lost its limbs; and though this loss has enabled them to occupy fresh places in nature, and to increase and flourish to a marvellous extent, yet it must be considered to be a retrogression rather than an advance in organisation. The same remark will apply to the Whale tribe among Mammals; to the blind amphibia and insects of the great caverns; and among plants to the numerous cases in which flowers, once specially adapted to be fertilised by insects, have lost their gay corollas and their special adaptations, and have become degraded into wind-fertilised forms." But it seems to me that on this point Mr. Wallace is inconsistent with himself; because at page 481, after referring to my figure of the wing in vol. iii. of our 'Transactions,' he says: "Even in the Apteryx, the minute external wing bears a series of nearly twenty stiff quill-like feathers"; and he goes on to say, "These facts render it almost certain that the Struthious birds do not owe their imperfect wings to a direct evolution from a reptilian type, but to a retrograde development from some low form of winged birds, analogous to that which has produced the Dodo and the Solitaire from the more pronounced Pigeon-type." He adds that our best anatomists agree that both Dinornis and Apteryx are more nearly allied to the Cassowaries and Emus than to the Ostriches and Rheas.* Now, from this point of view, I think the language in which I long ago characterised the Kiwi—although challenged by Professor Hutton and others—is fully justified, namely, that it is the diminutive and degenerate representative of the ancient colossal forms of wingless birds. Its very existence, as we now find it, is an illustration of the truth as formulated by Wallace himself, that "greater swiftness, increased cunning, nocturnal habits, change of colour, or the power of climbing trees and living for a time on their foliage or fruit, may be the means adopted by different species to bring themselves into harmony with the new conditions; and by the continued survival of those individuals only which varied sufficiently in the right direction, the necessary modifications of structure or of function would be brought about, just as surely as man has been able to breed the greyhound to hunt by sight and the foxhound by scent, or has produced from the same wild plant such distinct forms as the cauliflower and the Brussels sprouts."†

* At page 416, *op. cit.*, Mr. Wallace says, "Whales, like Moas and Cassowaries, carry us back to a remote past, of whose conditions we know too little for safe speculation. We are quite ignorant of the ancestral forms of either of these groups, and are therefore without the materials needful for determining the steps by which the change took place, or the causes which brought it about."

† Mr. Wallace, in acknowledging receipt of my pamphlet, wrote in appreciative terms of the paper as a whole, adding that on the only points on which he disagreed with me he had communicated an article to *Nature*. On turning this up (vol. lii., p. 60) I found the following criticism: "Its main subject-matter is a discussion of the various ways in which

I have referred to certain superficial characters; and for the purposes of our argument we need not at present go beyond these. The Apteryx, then, I take to be the most specialised type of its kind—an extreme form of degeneracy, using that term in its Darwinian sense. But, besides *Apteryx australis*, there are five, if not six, other species, more or less distinct the one from the other, but all closely allied in every respect, size and colour being almost the only distinguishing characters. I will enumerate these species, with the ascertained range of each. *Apteryx australis*, already mentioned, inhabits the southernmost parts of the South Island; *Apteryx mantelli*, Bartlett, and *Apteryx bulleri*, Sharpe, are spread over various parts of the North Island; *Apteryx oweni*, Gould, is met with in the wooded country in the northern and eastern portions of the South Island; *Apteryx haasti*, Potts, in the Heaphy Ranges and further south; *Apteryx occidentalis*, Rothschild, on the western slopes of the Southern Alps, and, curiously enough, in the Tararua Ranges on the west coast of the North Island; and, lastly, *Apteryx lawryi*, Rothschild, on Stewart Island.

Mr. Walter Rothschild, who owns the largest collection of Apteryges in the world, has, after mature consideration, decided to separate the spotted grey Kiwis into two species—*Apteryx oweni*, Gould, and *Apteryx occidentalis*, Rothschild. Of the latter he possessed for years a living example, obtained in the neighbourhood of Milford Sound, nearly as large as *Apteryx haasti* and very different in appearance from *Apteryx oweni*, having banded plumage, a dark head, and blackish-grey feet. To this species he refers Mr. Morgan Carkeek's example from the Tararua

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the peculiarities of structure, colour, distribution, and habits of New Zealand birds serve to illustrate the theory of Natural Selection, and often to afford very strong arguments in its favour. The address is very clear and forcible, full of interesting facts and suggestive observations, and will be read with interest by all naturalists. One or two points only call for any critical observation. Sir Walter Buller objects to the Apteryx being classed by Mr. Wallace as among 'the lowest birds,' because he says it is really 'an extremely specialised form.' But surely the Ratitæ are lower than the Carinatæ, and the Apteryx is so specialised as to be almost the least bird-like of the Ratitæ. If it is not to be classed among the lowest existing birds, where are they to be found?"

It will be seen, on referring to what I said, that what I objected to was the placing of the Kiwi among the lowest forms of bird-life "in the sense implied." In the sense now used by Mr. Wallace, I admit, of course, that the Kiwi as a Ratite form comes at the end of the chain in our earlier system of classification; but, as I understand it, that is a very different point to the one I was discussing. In accordance with that system, and having regard to their natural affinities, I placed the group of Kiwis at the very end of my 'Birds of New Zealand,' but that is in no way inconsistent with my argument as to Apteryx being a highly specialised form. Writing of this bird, the late Professor Owen said: "Here we have a true bird, exhibiting a remarkable modification of the whole ornithic structure, in reference to exclusively terrestrial life and nocturnal habits; and we learn from this adherence to a typical organisation, in a very rare exception, that the teleological conclusions respecting the typical construction, as it is manifested in the general rule, are in no way affected by such an exception, because the modification of one part necessarily affects that of many others, perhaps of the whole body. If, for example, the fixation and structure of the lungs require a broad sternum and concomitant modifications of the coracoid and scapula for the mechanical part of the respiratory process, then it may be more convenient for the levator of the humerus to rise below that bone from the sternum, and act in the due direction by a modification of its course, although the locomotion of the bird may in no way be facilitated by the aggregation of muscular substance beneath the centre of gravity, nor the size of the levator be such as to render its particular position a matter of any consequence in regard to that centre."

Professor Newton, in his admirable article on 'Birds' in the 'Encyclopædia Britannica,' referring to the extraordinary development of our Ratitæ, says: "If we take the birds alone, and compare the two subclasses into which the existing or recent members of the class are divided, we find the Australian region remarkable for its ornithic singularity. The smaller of these two subclasses, the Ratitæ, contains six very natural groups—which might well be called orders—including, according to the most exaggerated computation of their number, less than forty species, while the large subclass, the Carinatæ, comprehends some ten thousand species." In a footnote he adds: "If it be true, as seems to be most likely the case, that Dinornis and its allies were absolutely devoid of wings, we should in them have a divergence from the normal ornithic type which is altogether unique in the whole class, and for its singularity might well be set off against the multifariousness exhibited by the Didelphia"—one of the subclasses of Mammals characteristic of the Australian region.

ranges (North Island), and a number of specimens collected by different persons on the west coast of the South Island. Of the distinctness of his type I have no doubt whatever; but I am not quite prepared to follow him in uniting the others with it. They seem to me to be a form intermediate between it and the Little Grey Kiwi (*Apteryx oweni*) with which we are all so familiar. Here, in fact, we have an instance of the boundary-line between one supposed species and another being so indistinct as to occasion constant doubt and confusion in the discrimination of the forms.

In fact, the dividing lines between these species, at certain points, are so indeterminate that ornithologists are not yet agreed as to how many independent species should be recognised. Dr. Otto Finsch, the well-known German authority, contends that the North Island bird cannot be separated from *Apteryx australis*, except as a local variety, although in this view he now stands alone; Professor Newton, whose opinion always carries great weight with me, declares his inability to distinguish the former as a species distinct from *Apteryx lawryi* of Stewart Island, although he recognises *Apteryx australis*, which occupies an intermediate range of country. But the Professor is also in some doubt as to the propriety of admitting *Apteryx haasti* as a species.

Mr. Rothschild, who named the Stewart-Island bird *Apteryx lawryi*, in compliment to myself, is now convinced that it is identical with—not *Apteryx mantelli* (as Professor Newton suggests) but *A. australis*.

Then, again, with regard to *Apteryx mantelli*, in the North Island. Most people are familiar with the chestnut-brown Kiwi which inhabits the Pirongia ranges and is found all the way down the west coast to Wanganui. But all the specimens I have seen from the east coast are almost black in plumage, even the feet being blackish instead of whitish-brown as in the ordinary bird. I have decided to keep this form distinct, under the name bestowed by Dr. Sharpe in 1888, *Apteryx bulleri*; for the fact remains that the birds from this part of the country are always dark coloured, and, as such, readily distinguishable from the common Kiwi. As I have mentioned in my work (vol ii., p. 310), there is likewise a rufous-coloured form, with plumage of a very peculiar texture ('Kiwi-kura' of the Maoris), which I found breeding true in the Pirongia ranges; but, as this bird inhabits the same district as *Apteryx mantelli*, it can only, for the present, be regarded as a variety. Nevertheless it shows very clearly the latent tendency to vary.

Apteryx lawryi is the largest of these species, as *Apteryx haasti* (which is next in size) is the most handsome, owing to its chestnut-and-brown dappled plumage. *Apteryx lawryi* runs as it were in parallel lines with *Apteryx mantelli* and *Apteryx australis*, as *Apteryx haasti* does with *Apteryx oweni* and *Apteryx occidentalis*. But, whether all these species be accepted as distinct, or some of them be regarded as mere varieties of others (which will always be debatable ground), there can be no doubt whatever that they have all come from a common parent stock, and that within a period of time, geologically speaking, comparatively recent. Going back to earlier times, and reasoning by analogy, we may venture to infer that the remote ancestor of the degenerate parent form was a volant bird—probably one tolerably well furnished with wings and tail, with a proportionately large head and short bill, with the muscles of the posterior limbs far less developed than in the Kiwi, and with very different plumage, both as to form and texture.

It may be asked—how it is that we find the Kiwi developing a long stiletto-like bill, whilst another race of wingless birds, the Moas, belonging to the same order and inhabiting the same country, were perfecting themselves in an entirely opposite direction? But it must be remembered that, according to the ascertained laws of variation, divergence of character in opposite directions may take place even among members of one and the same species, at one and the same time, and within the same geographical area. Isolation, for such a purpose, does

not necessarily mean insulation, as some writers appear to assume. Wallace puts it very clearly: "Isolation will often be produced in a continuous area whenever a species becomes modified in accordance with varied conditions or diverging habits. For example, a wide-ranging species may, in the northern or colder part of its area, become modified in one direction, and in the southern part in another direction; and, though for a long time an intermediate form may continue to exist in the intervening area, this will be likely soon to die out, both because its numbers will be small, and it will be more or less pressed upon in varying seasons by the modified varieties, each better able to endure extremes of climate. So, when one portion of a terrestrial species takes to a more arboreal or to a more aquatic mode of life, the change of habit itself leads to the isolation of each portion."

Now, it is not difficult to imagine that in the case of a country which was gradually emerging from the depths of the ocean, presenting for long-continued periods of time low flats more or less covered with scrubby vegetation, available for purposes of concealment, a smaller size would be beneficial to the already practically wingless birds, the more so if correlated with a longer bill, for the purpose of hunting for annelids and insects in the increasing deposits of mould covering these newly-formed flats. And, bearing in mind that natural selection acts solely "by the preservation of useful variations, or those which are beneficial to the organism under the conditions to which it is exposed," we should in this case regard the so-called degeneration of the Kiwi as an improvement in the organism of the bird in relation to its conditions and environment. So also, in regard to those wingless birds which continued to inhabit the table-lands, and to subsist on fern-roots and the ever-present "cabbage-tree," should we regard a longer neck and a stronger bill as beneficial variations, especially if correlated with a more massive posterior development, such as that which distinguishes *Dinornis elephantopus* and *Dinornis crassus*. May not the "giant Kiwi" (*Megalapteryx hectori*), the remains of which were discovered and described by the late Sir Julius von Haast, represent one of the intermediate forms which have been stamped out and lost in the long-continued struggle for existence along the borderland, so to speak, of these different races of wingless birds?

As I have already stated, each so-called species of Kiwi is restricted in its range to a particular district. In the case of all the species this range is insular, save as to the appearance of the grey Kiwi on the Tararua range, which I shall presently endeavour to account for. Now, if any sudden catastrophe were to overtake New Zealand, destroying all animal life, the remains of the different species of Kiwi (so far as they could be distinguished) would be found in different localities and never commingled. This is not the case with Dinornis and its allies. The bones of about a thousand birds were exhumed by Sir Julius von Haast from the Glenmark marshes, and these comprised the skeletons of several genera and numerous species, varying considerably in stature, all mixed up indiscriminately together, showing that these birds had inhabited the plains of Canterbury at one and the same time. I have endeavoured to furnish an explanation of this in my introduction to the 'Birds of New Zealand,' pages xxxiv. and xxxv. Adopting a theory first put forward by Professor Hutton—to whom I acknowledge my indebtedness—I attempted to show how this could have been brought about by natural causes. By going much further back in time—and that is the charm of the evolution theory, that it imposes practically no limits as to time and space—I have supposed that in very ancient times two or more species of brevipennate birds, themselves the descendants of volant birds of a still earlier epoch, roamed over a great southern continent, which, by some convulsion of nature, was afterwards submerged, leaving its higher levels and mountain-tops exposed in the form of numerous scattered islands, on which the survivors of the wingless race of birds would naturally remain; that this state of things continued long enough—how long it is

impossible even to conjecture*—for the inhabitants of each island to develop new characters suited to their special environment in each case, thus bringing into existence in the end the various species of Dinornis and its allies as we now know them; that a widespread upheaval or elevation of the land followed, reuniting most of the islands, and resulting in the areas now known to us as the Islands of New Zealand, when, of course, the Struthious birds which had been developed in the smaller insular areas would be able, in process of time, to commingle on common ground. "In process of time," I say, because it would naturally take a considerable time for the newly-elevated areas to become covered with vegetation, although, on the other hand, it is quite possible that this elevation may have been gradual in its operation everywhere. I suggested that when, by the gradual subsidence of their domain beneath the waters of the great Pacific, they were driven as it were into a corner and overcrowded, the struggle for existence became a severe one, and the extinction of the race then commenced; that the more unwieldy giants, thus cabined and confined, were the first to succumb; and that the smaller species, perhaps in course of time differentiated from their ancestors by the altered physical conditions of their environment, continued to live on till their final extirpation by man within recent historic times. Professor Hutton supposes two successive submergences and elevations of the land at long intervals, but in this I am unable to follow him. Without that, the theory is sufficient, I think, to account for the co-existence in comparatively recent times of the various genera and species. But, as the modifications in form and structure constitute important generic distinctions, very long periods of time must have elapsed after the continental submergence before the final elevation of the land which made it possible for these wingless birds to commingle as they evidently did in later times. On the assumption that the North and South Islands were never reunited after the great submergence, these two areas having been independently formed by the fusion of different sets of islands, north and south, when the elevation took place, this theory will account for the singular fact that the Dinornis remains found in the North Island represent different species of birds from those of which remains have been so abundantly discovered in the South.

Professor Hutton had been of opinion that the smaller forms of Palæognathæ in New Zealand must have preceded the larger; and the fact that bones of only the smaller species of *Dinornis* and *Syornis* have as yet been found in both Islands seems to favour that view. But the evidence on this point is, I think, far from being exhausted, for fresh discoveries of Moa-bones are still being made from time to time, and in the most unlikely localities. On the other hand, whatever date may be assigned for the extinction of the Moa (and upon this question there is much difference of opinion), there seems little doubt that the colossal forms, such as *Dinornis maximus*, *D. altus*, *D. validus*, and *D. excelsus*, were the first to become extinct, because none of their remains have ever yet been found in the ancient kitchen-middens, mixed up with the rejectamenta of human feasts, or bearing evidence by chipping or gnawing of manipulation by man in a recent state; besides which they have sometimes been found in a highly-fossilized or mineralized condition, unlike the bones of the smaller species, which contain much organic matter and often look perfectly fresh. I am of opinion that the larger forms are the more

*Lord Kelvin, the late President of the Royal Society, after thanking me for a copy of my paper, wrote: "You and the geologists must, however, be satisfied with twenty million years for the earth's age. The 306 million years for the denudation of the Weald in Kent, given as part of his foundation in the first edition of 'The Origin of Species,' was dropped by Darwin himself after I showed it to be inconsistent with dynamics, and I think you will not find it in the third or later editions. The 270 million years 'since the Cambrian period,' which you quote from Lyell, is utterly untenable. He supported his assumption of infinite past time for geology by a thermo-electric invention of a perpetual motion as good as many of the million 'perpetual motions' that have been invented by ingenious persons who have not learned dynamics or physics." A *sufficient* length of time was my postulate; and twenty million years suits my argument quite as well as the more extended period.

ancient, and are those that roamed originally over the afterwards submerged continent, and that the smaller-sized Moas, of different genera and species, are the descendants of those which had been specialised in the various islands during the long epoch following the continental submergence.* Professor Hutton, accepting the outcome of the late Professor Parker's important researches into the embryology of this form, admits that in the Kiwi the hind limbs undergo a relative diminution in size between the time of hatching and the attainment of fully adult proportions, especially in the case of the female; and he adds: "This implies that the ancestral Kiwis were, like *Megalapteryx*, larger than the living birds; and we may infer the same thing from the great size of the egg. It is a legacy from a larger bird which is not easy to get rid of. The greater proportionate size of the female is probably due to its having to lay such a very large egg. The males have decreased in size more rapidly than the females, who were handicapped by such large eggs." Professor Hutton suggested that the reverse of this obtained in the case of the Moas; but there is no evidence of that. After a critical examination of all the evidence afforded by the bones and their distribution, he says: "Evidently *Anomalopteryx* and *Palapteryx* are the oldest forms; but if *Palapteryx* had wings it could not have been derived from the wingless *Anomalopteryx*; and, if the birds were increasing in size, *Anomalopteryx* could not have been derived from *Palapteryx*."† Exactly so; but on my hypothesis these difficulties disappear, and the supposed conditions are in harmony with it. In this connection I may mention the curious fact that, although *Anomalopteryx didiformis* is one of the smallest of the Moas, scarcely exceeding in size the European Bustard, it had proportionately the largest skull of all the *Dinornithidæ*. Commenting on this, Professor Owen remarks that, if the peculiarly nutritious roots of the common fern contributed, together with buds or foliage of trees, to the food of the various species of Moa, the concomitant gain of power in the locomotive and fossorial limbs does not appear to have called for a proportionate growth or development of brain or of bill.

As with the Kiwi, it would seem that the development of the Moa was downwards, or in the way of degeneration, and the restriction of its range to small insular areas would doubtless favour this dwarfing process.

One can understand how in process of time the various species of Kiwi now known to us have become evolved from the parent stock, by means of natural selection and the survival of the fittest, operating under well-established natural laws. Any divergences of character, however small to begin with, long continued and persisted in, would account for any number of so-called species in various parts of the country. For, a species—what is it? What does the name denote? Of what use is it to science except as an artificial definition, and for the greater convenience of systematic classification?

But the great difficulty in any theory on the subject is to account for the presence of the Grey Kiwi on the west coast of both Islands. Our knowledge of its existence in the North Island rests on a skin brought to me in a fresh state by Mr. Morgan Carkeek, who obtained it

* The late Professor Jeffrey Parker, F.R.S., in a letter dated Feb. 14, 1898, wrote to me saying that his observations on the skull of the Dinornithidæ contradict my view that the larger forms of Moa are the most ancient, the oldest and least specialised type of skull being that of *Mesopteryx*, whilst the very tall forms and thick-legged ones are highly specialised in different directions. He adds: "You are quite right about the extreme specialisation of *Apteryx*."

Professor Hutton at one time believed that the smaller forms of Dinornithidæ in New Zealand must have preceded the larger; but it would seem that, after closer study of the subject, he has arrived at the same conclusion as myself; for, in his article on 'The Rise and Fall of the Moa,' communicated to the *Canterbury Press* in November, 1896, he says: "The commoner kinds of Moa were comparatively small birds, from three feet to five feet high, and it seems probable that the giants of the race, which attained a height of about 12 feet, had all died out before the advent of man. At any rate, there is no record of any bones of *Dinornis maximus* or of *Dinornis giganteus* having been found among the remains of Maori feasts."

† 'On the Moas of New Zealand,' by Captain F. W. Hutton, F.R.S., *Trans. N. Z. Inst.*, vol. xxiv., p. 149.

just below the snow-line on the highest of the Tararua ranges, where, he states, he could have collected many more. For the present, I confess that the presence of this species in the North Island is very perplexing. One solution that suggests itself to my mind is that it may have been introduced in former times through human agency. It will be remembered that the Maoris have a tradition that the Pukeko, or Swamp-hen (*Porphyrio melanonotus*)—which, until recent years, when its haunts were invaded and drained, was excessively abundant in both Islands—was first introduced by their ancestors, who brought tame birds with them in their canoes from Hawaiki. It must be borne in mind also that the range of the Grey Kiwi includes the north-west coast of the Nelson District, for specimens which I obtained from that locality have been referred by Mr. Rothschild to his *Apteryx occidentalis;* and, furthermore, that the passage to and from the Kapiti coast, on the opposite side of Cook Strait, could easily be effected by the Maoris in their war-canoes. To entrap a few Kiwis, and bring them across alive in flax cages, would have been a very simple operation, and a far less ambitious project than that of stocking New Zealand with the Swamp-hen from far-off Hawaiki. The suggestion does not seem an unlikely one, when we remember that the Kiwi was always highly prized by the Maoris from the earliest times, both as an article of food and on account of its feathers.

On the theory put forward, and assuming, as we fairly may do, that the North and South Islands have never been united since the continental submergence—in other words, that there was a simultaneous elevation of the two areas, north and south, with a permanent sea-channel dividing them—we can understand and account for the existence of closely-allied representative species in the two Islands. I will give some examples: in the North Island, the Blue-wattled Crow (*Glaucopis wilsoni*); in the South, the Yellow-watttled Crow (*Glaucopis cinerea*); in the North Island, the Saddle-back (*Creadion carunculatus*); and in the South, its grey ally, *Creadion cinereus*. It is true that *Creadion carunculatus* is found also in the South Island, which is the proper home of *Creadion cinereus*. This may, I think, be accounted for by an accidental colonisation at some time, through the crossing of stray individuals to the other side of the Straits: even a single pair would suffice. Rare as this bird now is along the wooded shore on the north side of Cook Strait, I can remember that, about forty years ago, it was more abundant there than in any other part of the country. But to resume my list of examples: in the North Island we have the Thick-billed Thrush (*Turnagra tanagra*); in the South, the common *Turnagra crassirostris;* in the North Island, the Wood-robin (*Miro albifrons*); in the South, its congener *Miro australis;* in the North Island, the Whitehead (*Clitonyx albicapilla*); in the South, the Yellowhead (*Clitonyx ochrocephala*); in the North Island, the White-breasted Tomtit (*Muscitræa toitoi*); in the South, the Yellow-breasted Tomtit (*Muscitræa macrocephala*); in the North Island, the Pied Fantail (*Rhipidura flabellifera*); in the South, the Black Fantail (*Rhipidura fuliginosa*). The same remark applies to the former of these as to the Saddle-back, and the same explanation may be offered. It will, perhaps, be objected that this bird is too weak-winged to cross the Strait under any circumstances; but, as against this, I may mention that during the past twenty years there have been several well-authenticated cases of the Black Fantail crossing the Strait to the North Island; and of late years there has not been wanting evidence of its breeding there. What, therefore, is there to prevent such a species becoming naturalised in the North Island, and that without the intervention of any but natural causes? A gale of wind, under favourable conditions for the passage of the Strait (about 18 miles) would alone be sufficient to occasion this dispersal of the species.

In addition to the cases enumerated above, I may instance the remarkable Ground Owl (*Sceloglaux*), of which, as we now know, there were two species—the White-faced Owl (*S. albifacies*) now on the border-land of extinction, confined to the South Island—and the smaller, Rufous-faced Owl (*S. rufifacies*), now presumably extinct, which inhabited the North Island. Of this latter

form the single existing specimen—obtained in the Wellington district nearly half a century ago —will be found figured and fully described in vol ii. of this 'Supplement.'

Now, all the representative forms I have named are accepted by ornithologists in general as good and true species. But take any two of them and compare them carefully. Who can for a moment doubt their common parentage?—how far back in time, it is not our present purpose to enquire. "Species," "sub-species," and "geographical forms" are now terms in general use among ornithologists, as well as among other specialists, and, as it seems to me, simply for the purpose of indicating the distinctness or otherwise of the lines of demarcation separating one from another in their present stages of development under the slow and invisible, but nevertheless inevitable and sure, processes of that law of evolution which governs the whole Animal Kingdom. When we come to study the matter more closely it often seems well-nigh impossible to draw any specific line at all. So-called species often appear to run into one another by insensible gradations; so much so, indeed, that no two naturalists are agreed as to how much persistent difference is necessary to constitute a species, as distinguished from a sub-species or variety. Take, by way of illustration, the various forms of Wood-hen (*Ocydromus*) inhabiting New Zealand. Dr. Bowdler Sharpe, who, as a rule, does not err on the side of "lumping," has declared (Bull. B. O. C., 1893, p. 30) that he finds it impossible to distinguish *Ocydromus greyi* of the North Island from *Ocydromus earli* of the South Island. He says further (*loc. cit.*, p. 29) that he prefers the simple arrangement in my first edition of the 'Birds of New Zealand,' limiting the number of species to three, to that of my second edition, fifteen years later, which admits five species of the group. This alteration, however, was not made by me hastily or without full consideration. I believe I have critically examined a very much larger number of *Ocydromi* than any other working ornithologist, and, although I do not wish to underrate the perplexities presented by the intergrading of plumage, I think that I have adopted a very cautious rule of admission. Professor Hutton has recognised at least one more form—namely, *Ocydromus finschi*—and a naturalist given to what is termed "splitting" might easily have increased the number still further. But this is the *crux* of the whole thing. In this particular instance the species of one naturalist is the "sub-species" of another, and the "local race" of a third. What is this but the existence of transitional forms under the steady march of evolution?

But the question of the great variability of the South Island Wood-hens opens up a larger one, which I confess myself quite unable to answer. How is it that in the North Island there is but one well-marked species of Wood-hen spread over its entire area, whilst in the South Island, under practically the same conditions of environment, there are at least four species, and possibly more, merging into one another in such a way as to puzzle even the most expert ornithologists?

The genus *Ocydromus* offers an exceptionally good example for a study of this sort, because, although furnished with ample wings, the quills are soft and useless, and the birds in consequence are flightless.

To take another instance of the kind: the Kakapo or Ground-parrot (*Stringops habroptilus*) has ample wings, and yet it is incapable of flight. The presence of this flightless bird, essentially the same in all respects, in both Islands, presents a difficulty which cannot be ignored. Some species are, however, more persistent in their character than others; and it may be that the Kakapo, as it existed in different areas before the final elevation, had reached its full development, and has remained stationary ever since. Its markings had become so exactly like the green mosses and other vegetation among which it feeds, thus effectually protecting it from birds of prey, and, in the absence of feral animals, the faculty of flight had become so unnecessary to it, that it is difficult to see in what direction natural selection could operate further to the advantage of the bird. It may be asked why, seeing that the Kakapo is flightless from long disuse of its wings, these members have not been more completely aborted, or dwarfed to mere

rudiments, as in the case of the Kiwi? The obvious answer is that, allowing the necessary time —in how many generations it is impossible to say—the same results would naturally come about. How long it may have taken for the Kiwi to become practically wingless since the process of degeneration commenced, we have no means of even guessing. But our pestilent civilisation has, of course, put a stop to all that; and within measurable time the Kakapo will disappear altogether—passing out of existence, in full possession of its wings, but feeble in their quills, and crippled by the atrophy of their muscular mechanism.

This incidental reference to the Kakapo and its protective colouring leads me into another very interesting field of observation—namely, the gradual adaptation, by natural selection of course, of certain species to their habitual environment by the acquisition of protective colours. The olive-green Bell-bird is almost invisible to the eye as it clings to the leafy climbing 'tawhiwhi' (*Metrosideros scandens*), and inserts its brush-tongue into the corolla of the crimson flower; the grey-and-white Ground-pipit eludes the most practised eye as it perches on a dry log, or nestles by the wayside; the Bronze-winged Cuckoo so harmonises with its surroundings as it rests silently on a low bough that you may be within a yard of it without detecting its presence; the Dottrel and the Godwit squat on the sands without being seen; the Wry-billed Plover hides itself among the loose pebbles and shingles of its own grey colour; the green Parrakeets are undistinguishable from the bright evergreen vegetation among which they feed; the Kaka, but for its discordant cry, would generally be safe from observation in the midst of the brown branches among which it loves to climb and explore for insects; the Rifleman, the smallest of our native birds, is quite invisible as it clings to the lichen-covered bark; and the Bush-wren hops in safety among the moss and vegetation of the forest to which its own colours so closely assimilate. And so one might go on selecting examples almost without end, in illustration of the well-known law to which I have referred, as being almost universal in its application and effects.

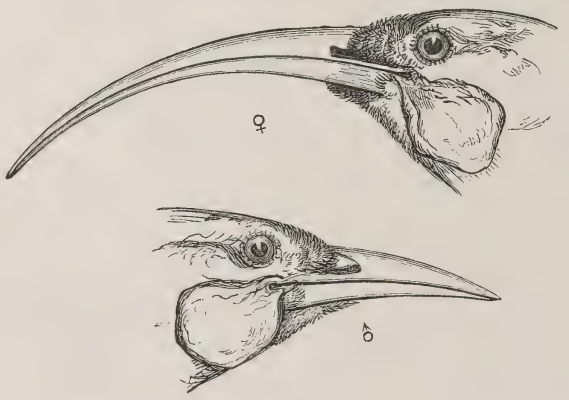
Leaving birds, however, for one moment, let us consider the remarkable correlation of colour with its surroundings in the case of many of our lizards. The beautiful Green Lizard (*Naultinus elegans*) so exactly harmonises with the 'manuka' bushes on which it is usually found that it requires a very practised eye to distinguish it. The protective resemblance is rendered more complete by the leaf-shaped markings of yellow on the back and sides; and it is pretty clear that this particular character has been acquired by natural selection, or descent with modification for protective purposes, inasmuch as the young of this species is of a uniform green colour. These remarks apply with even stronger force to my *Naultinus pulcherrimus*, from Nelson, although being a somewhat rare species, it is perhaps less noticeable. Here the irregular white markings, intermingled with the yellow and green, coupled with the animal's peculiar habit of curling up its tail in the form of a "Catherine's wheel," render the deception absolutely perfect. In this case also the young is of an almost uniform green colour, varied only with leaf-like markings of a darker green on the back. Then, again, as I have previously pointed out, the markings on the back of my *Naultinus sylvestris* (discovered by Mr. Annabell at Wanganui) so exactly resemble the minute yellow lichens which cover stems of dead wood in the forests as to render it at all times perfectly safe from detection in such situations. *Naultinus sulphureus*—whether we regard it as a distinct species or only a pronounced local variety—is admirably adapted by its uniform yellow colour to the sulphur deposits of Rotorua, where alone it has been met with. But to come to the common species: where could we find a more beautiful adaptation of colouring to the natural surroundings than in the case of our common Tree-lizard (*Naultinus pacificus*), the shades and markings of which present an almost endless variety; or in that of the variable *Mocoa ornata* and *Mocoa zealandica*, inhabiting our stony places and roadside vegetation? A case even more remarkable still is that of our wonderful *Sphenodon punctatum*, or

Tuatara Lizard. I have not space now to refer to the wonderful characteristics of this living representative of a remotely ancient race; but I may mention that the Tuatara has been found to possess, concealed under the tough skin of the forehead, the vestiges of a third but now obsolete eye, the functional parts being present, even to the optic nerve! It has become extinct on the mainland; and it is a very curious fact that, through long isolation, it has become differentiated in colour in the several islands or groups of islets which it inhabits. With the exception of a green form, exhibiting some structural modifications, which I have dedicated to our great herpetologist, under the name of *Sphenodon guentheri*, it has been found impossible to distinguish these forms except as local forms, sufficiently well marked, however, to admit of their being referred to their respective island habitats. What are these, I would ask, but incipient species? Allowing sufficient time under the existing conditions of life, and reasoning by analogy, each island or group of islets must in the end possess a distinct species of *Sphenodon* exactly suited to its environment. It is, moreover, sufficiently clear that nothing but the island asylum could have saved this lowly-organised and archaic form from absolute extinction.

Less fortunate has been another form of New Zealand lizard, the Kawekaweau, whose quasi-arboreal habits of life have prevented its taking advantage of this last refuge. From the accounts of the natives, the Kawekaweau appears to have been a form of Iguana inhabiting the deep forest, and there can be no doubt that it lingered in the land till within the last five and thirty years, when the remnant of its race succumbed to wild pigs and other natural enemies. It is always described by the Maoris as beautifully marked with alternate bands of colour, and reaching at maturity to a length of 2ft. or more.*

But, although these are good illustrations of the correlation of colour and of the extinction of well-established forms in the struggle for existence, I feel that I am rather digressing from my subject.

Closely connected with this subject of assimilative colouring is that of the gradual adaptation of structure to the conditions of existence. In the 'Birds of New Zealand' I have called attention to some remarkable cases of this kind, and notably to that of the Huia (*Heteralocha acutirostris*)—an instance quite unique in the whole class of Birds—where the sexes present differently formed-bills, specially adapted to their habits of life and general economy. Now, on what principle, apart from the Darwinian theory, can we explain this remarkable sexual difference?



THE HUIA.

And to mention another case, that of the Wry-billed Plover (*Anarhynchus frontalis*) is a very remarkable one. In this instance the bird has the bill turned or twisted to the right, this asymmetry being admirably adapted to this Plover's peculiar mode of feeding among the pebbles of the seashore. In the case of our beautiful Red-necked Avocet (*Recurvirostra novæ-hollandiæ*), the curvature of the bill is upwards instead of sideways; and in both forms this marvellous departure from the normal type of a Plover's bill is not only correlated to the peculiar habits of the bird, but is congenital, being present in the unhatched embryo. Then,

* It is significant that the Long-tailed Cuckoo (*Urodynamis taitensis*), whose streaming tail-feathers are handsomely barred in their whole length with chestnut and black, is also known by the name of Kawekaweau in many parts of the country. In like manner the name Kakariki (indicative of the colour) is applied alike to the Green Lizard and to the Green Parrakeet of our woods.

again, what is the Rock Wren (*Xenicus gilviventris*) but an extreme development of the Bush Wren (*Xenicus longipes*)—which has put off its green plumage for the dun-coloured dress more in harmony with its surroundings among the rocks on the open mountain, and has acquired a longer hind claw, so as to fit it for this different habitat—or *vice versa*? The particular direction of the development does not of course affect the argument. And it is a significant circumstance that I possess intermediate forms; so much so, in fact, that I have been in doubt as to which of the two species they really belonged. Or, to to take just one more case: who can doubt that the fleshy membrane on the bill of our blue Mountain Duck (*Hymenolæmus malacorhynchus*) has been specially developed to enable it to hunt the more successfully for the peculiar stone-encased caddis-worm of our mountain streams, which now forms its principal article of food?

But now to revert to my main line of argument. In considering the problem of representative species in the North and South Islands respectively, it must be borne in mind that there are probably many broken links in the chain of succession through the disappearance of representative forms. We all know that the existing avifauna is being stamped out and destroyed by a variety of artificial causes, not the least among them being the naturalisation of foreign birds by way of acclimatisation, on the one hand, and the introduction of bloodthirsty animals like stoats, weasels, and ferrets, on the other. But long before the effects of our drastic colonisation made themselves felt, many of the ground species were dying out, in obedience, no doubt, to that inscrutable law of nature whereby races of animals and plants, apparently of their own accord, die out and give place to other forms of life. I remember, when I was a boy, the interest with which I followed the Maoris' descriptions of birds that had even then become rare or were disappearing from the land. One bird, a species of Rail or Coot apparently, was often mentioned to me under the name of Pukunui—so called from the abnormal size of its stomach. It was described as a reddish bird, frequenting swamps and marshes, and I was constanly hearing of it. Indeed, I never made an excursion among the Maoris anywhere, without making diligent inquiry for the Pukunui. I offered liberal rewards, and often felt that the bird was almost within my grasp. At length, at the small bush settlement of Mareikura, on the North Wairoa River, one was caught at the edge of a raupo swamp near the village by my trusty lieutenant, Tamati Nui. It had been taken unhurt, and, pending an opportunity of forwarding it to me, it was kept tethered by a flax-string in the "marae" or open courtyard. A passing Maori unconsciously snapped the string with his foot, and, unfortunately for me and for science, this "*rara avis in terris*" made its escape. Nearly fifty years have elapsed since this occurence, and I have never so much as heard of the capture of another Pukunui!

Owing to its fore-neck and breast being represented as ferruginous red, I am inclined to think that Colenso's Coot, described on page 75, was in reality this bird.

In this connection, and also as marking the tendency towards extinction in certain lines, it is of interest to notice that the Ralline genus *Notornis* was contemporary with the smaller species of Moa, and that the bones of the living bird obtained in Otago differ so much from those of the fossil remains discovered by Mr. Walter Mantell at Waingongoro, in the North Island, and referred by Professor Owen to a form which he named *Notornis mantelli*, in honour of the discoverer, that Dr. A. B. Meyer, of Dresden, has proposed to discriminate two species, distinguishing the southern form as *Notornis hochstetteri*, in compliment to the Austrian explorer. If Dr. Meyer should be right in his determination, we have here a beautiful instance of representation, the North Island species having long since disappeared, whilst the South Island species is verging on extinction.

I think I have now noticed all the main points bearing on this question arising out of a study of the birds of the North and South Islands. But it is to the smaller insular areas that we

naturally look for the strongest proofs in support of our theory, because the conditions there are altogether more favourable. Let us first take the Chatham Islands, lying about four hundred miles to the south-east of Wellington. It is very clear that there has been no land communication between the Chathams and New Zealand since the continental submergence. This has allowed time for the production, by natural selection and the survival of the fittest, of several distinct species. Now, let us see what we have. Notably, another species of Bell-bird *(Anthornis melanocephala)* has come into existence—a much larger and finer species than our Korimako *(Anthornis melanura)*, although presenting the same adolescent and sexual phases of plumage. But the curious thing about it is, that, side by side with this endemic species, our Bell-bird is also to be found in the Chatham Islands and on the adjacent islets (Pitt Island and Mangare). To my mind the only explanation of this phenomenon is the same that I have already given ('Trans. N.Z. Inst.', vol. xxiv., p. 65) for the occurrence side by side of *Cyanorhamphus unicolor* and *C. erythrotis* on Antipodes Island—namely, that the smaller species owes its existence there to a comparatively-recent colonisation, the result of some accidental flight or migration from the mainland,—with this difference: that in the case of *Cyanorhamphus erythrotis* the irruption of the parent form must have been long anterior to the colonisation, so to speak, of the Chatham Islands by the New Zealand Bell-bird, inasmuch as there has been time for a sufficient modification of characters to entitle it (in the opinion of many ornithologists) to take specific rank, distinct from *Cyanorhamphus novæ-zealandiæ*. As to such occasional migrations there would be nothing in the distance, at any rate, to negative such a supposition. Then, again, we have a Wood-pigeon (*Hemiphaga chathamensis*) very similar to the New Zealand bird, but sufficiently differentiated to be accepted as a good species. Other representative forms are the Black Robin (*Miro traversi*), the Bush Warbler (*Pseudogerygone albofrontata*), and the Chatham Island Fern Bird (*Bowdleria rufescens*). The near relatives of all these are to be found in New Zealand. Again, instead of *Ocydromus*, there is a small flightless Rail—a degenerate Ocydromine form—which Professor Hutton has made the type of a new genus, *Cabalus*. To this genus (although the form is less aberrant from the typical *Rallus*) I had also referred Dieffenbach's Rail, which is now extinct, the only known example being the one in the British Museum, obtained about the year 1845; but, for the reasons stated on page 45, I have now placed it in the genus *Nesolimnas*.

So far as we are aware, no bones of *Dinornis* have yet been discovered in the Chatham Islands, but I have no doubt that they will be met with sooner or later; and I feel pretty sure that, when discovered, they will be found to be of different species (perhaps of different genera) from those known to have inhabited New Zealand in comparatively recent times: that is to say, that our theory seems to require, for the sake of consistency, that this should be so, inasmuch as the same differentiation would be taking place in the Chatham Islands as in the other insular areas after the great submergence. And, as the Chatham Islands unquestionably formed part of that ancient continental area of which I have been speaking, we may reasonably expect to find there, sooner or later, fossil remains of the earlier forms (such as *Palapteryx*), similar to those that have been unearthed in the North and South Islands of New Zealand. As for the remarkable avian remains discovered by Dr. H. O. Forbes in the Chatham Islands, and referred by him to a genus allied to *Aphanapteryx*, we may feel equally assured that similar remains exist in New Zealand, and will hereafter be found in abundance to reward the diligent explorer.

The Auckland Islands, again, offer several good examples. Among the species specially developed there may be mentioned a Ground-pipit (*Anthus aucklandicus*), very readily distinguishable from our New Zealand bird by its rather larger size and warmer colouring; and a Green Parrakeet (*Cyanorhamphus aucklandicus*), much smaller, but in other respects similar

to our *Cyanorhamphus novæ-zealandiæ*. Representing our *Hypotænidia philippensis*, there is a very distinct species of Rail (*H. muelleri*, Rothschild), of which the only known specimen is in the Natural History Museum at Stuttgart; and, as if representing our *Elasmonetta chlorotis*, there is a flightless Duck (*Nesonetta aucklandica*) frequenting the seashore as well as the streams. But, what is still more significant and curious, there exists in the Auckland Islands a species of Merganser (*M. australis*), of which genus there is no representative in New Zealand, or indeed anywhere else in the Southern Hemisphere. The Bell-bird is there also, but seems to be absolutely identical with the New Zealand form (*Anthornis melanura*), showing, as I think, a comparatively recent introduction.

On Antipodes Island, as already indicated, there is a strictly endemic Parrakeet (*Cyanorhamphus unicolor*), a species living abundantly on this oceanic rock, but not to be met with in any other part of the world, and commingling with a species (*C. erythrotis*) more nearly approaching to the typical *C. novæ-zealandiæ*. Going further south we come to Macquarie Island, where there is a Rail differing so perceptibly from ordinary examples of *H. philippensis* that Captain Hutton has proposed to distinguish it as *H. macquariensis;* and, although I am not prepared to concede to it distinct rank as a species, its presence there is another proof of the existence of transitional forms.

On the Snares, a group of islets about seventy miles south of the southernmost extremity of New Zealand, there is a peculiar form of Fern-bird, which I have distinguished under the name of *Bowdleria caudata*, very similar to *Bowdleria punctata* of New Zealand, but quite distinct as a species, and being intermediate in character between the last-named bird and *Bowdleria rufescens* of the Chatham Islands. Now, no ornithologist who has studied the subject can doubt that these three closely-allied forms, although now perfectly distinct as species, have sprung from a common parent-form. Curiously enough, another Chatham Island bird, the Black Robin (*Miro traversi*) is abundant on the Snares, although not found in any part of New Zealand.

Then, again, the Kermadec Islands possess a Green Parrakeet (*Cyanorhamphus cyaneus*) which Count Salvadori declares to be distinct; and, although many naturalists will insist that this and the other island forms are, for the most part, local varieties of the well-known *Cyanorhamphus novæ-zealandiæ*, their very existence as such is the best evidence of the constant operation of the law of development by variation and the survival of the fittest.

Even the sea-birds, whose range is practically unrestricted, furnish additional and, indeed, very important evidence. Mr. Rothschild, with the aid of the late Mr. Salvin, our great authority on the Petrel family, made an important investigation of the Albatroses of the Southern Hemisphere. Talking over the result with me, he said: "Why, every group of islands seems to have its own species of Albatros!" And, in a sense, this is true. Here we have birds enjoying the freedom of the wide ocean—commingling daily on their great hunting-fields on the face of the deep; and then, on the approach of the reproductive season, separating themselves, according to their species, and repairing to their own island-nurseries to breed. As far as our information at present goes, Campbell Island is held exclusively by my new species *D. regia*, the noblest member of the group. The Auckland Islands are occupied by thousands of *Diomedea exulans*, with the exception of a small colony of *D. regia* breeding in a remote corner of the main island, and at a somewhat earlier season—according to Captain Fairchild's observations, four or five weeks earlier. On the Snares *Diomedea bulleri* reigns supreme. The Albatros breeding on the Sisters, some outlying islands in the Chatham group, on which the Maoris are said to have collected as many as a thousand young birds in one season, is probably *Diomedea melanophrys*, which is plentiful in that latitude; but I have not yet been able to obtain any specimens from that locality for identification. The breeding-place of *Diomedea salvini*, Rothschild, is apparently the Bounty Islands.

Many of the smaller species of Petrel, it may be observed, confine themselves to particular islands: for example, *Puffinus carneipes* is the commonest of birds on the Island of Karewa, in the Bay of Plenty, but, so far as I am aware, has never been found breeding on any other island off our coast.

As with the Petrels, so in a limited sense with the Shags and Penguins, many of the species of each having their particular island group, which they resort to, for breeding purposes, to the exclusion of all others.

Finally, I may refer to the Snipes, the local distribution of which is very remarkable indeed. My *Gallinago pusilla*, the smallest of the Snipes, is an inhabitant of the Chatham Islands, where it is apparently very plentiful, Mr. Rothschild having, as he informs me, received from his collector, at one time, fifty-four specimens. Sir James Hector has recorded two specimens

DIOMEDEA SALVINI NESTING ON THE BOUNTY ISLANDS. (Morris.)

from New Zealand, but it is evidently only a straggler with us. *Gallinago aucklandica* appears to be confined to the Auckland Islands, *Gallinago tristrami* (if really a distinct species) to Antipodes Island, and *Gallinago huegeli* to the Snares. It will be seen, therefore, that these island-species are very sedentary; and they have no doubt acquired their distinctive characters through long isolation. Whether they are accepted by all ornithologists as true species, or only as local varieties, does not affect, in the slightest degree, the force of our argument in favour of the creation of new forms by a process of descent with modification. But I have probably pursued this branch of the subject quite far enough. There is another aspect of the question upon which I should like to say a few words before I close.

I have always stated my belief that our colossal forms of *Dinornis* were the most ancient and were the first to become extinct. Those on which the Moa-hunters feasted (as attested by the remains now found in the old kitchen-middens) were confessedly of a smaller stature. Probably

the very last to disappear was the small *Mesopteryx didinus*. In 1878, Mr. Squires, of Queenstown, obtained and sent to the British Museum the head, with a continuous part of the neck, of this species of Moa, with the trachea enclosed and covered by the dried integument, and exhibiting even the sclerotic bone-ring of the dried eye-balls; also the bones of both legs with the feet covered by the dried skin, with some feathers adhering to it, and the claws intact. Be that as it may, the only representatives of this ancient race that we have at the present day are the diminutive Kiwis, of which I have been treating. This remarkable sequence in the development of animal life on the earth, the larger forms preceding in geological time the smaller, appears to have been universal. The distinguishing feature of the Mesozoic period was the development of Saurians of marvellous size. From the Oolitic beds in the Rocky Mountains of North America, the remains of huge Dinosaurians have been obtained, among these being the *Atlantosaurus*, the largest land animal yet known to have existed on the earth; for Professor Marsh describes it as "having been between 50 ft. and 60 ft. long, and, when standing erect, at least 30 ft. high!" At the present day our largest saurians are crocodiles and alligators. But, coming down to Pliocene and Pleistocene times, we have only to think of the mammoth and the mastodon, the dinotherium and the megatherium, the diprotodon and the Irish elk, and compare them with the elephant and the hippopotamus, the rhinoceros and the buffalo, of the present epoch, to realise the full force of this truth.

But now let me give another illustration from nearer home—one drawn from the discoveries of Dr. Stirling, F.R.S., in South Australia,* the importance of which, from a scientific point of view, it would be impossible to over-estimate. I will shortly state the facts so far as they have yet become known. In the central part of South Australia there is a vast stony desert lying to the eastward of Lake Frome and to the westward of the Grey Range. It is described as being unspeakably arid and desolate, abounding in salt-pans, of which Lake Mulligan is the largest. This forbidding district is entirely destitute of fresh water and almost absolutely devoid of animal life of any kind. The intrepid explorer, Captain Sturt, in 1844, penetrated about half-way across this inhospitable plain, and then, after suffering great hardships, had to make his way out of it to escape absolute starvation. Up to the present time this region has been to all intents and purposes a sealed book. But an important discovery of fossil bones has been made at Lake Mulligan, and, chiefly through the scientific enterprise of Dr. Stirling (aided all through by the generous liberality of Sir Thomas Elder), this discovery has been followed up with very astonishing results. A correspondent of the *Scotsman*, writing on the spot and from his own knowledge and observations, states that, after four months' digging among the gravels of the valley of the Mulligan, some two thousand bones, representing seventy different mammals and birds hitherto unknown, had been unearthed, and safely lodged in the South Australian Museum at Adelaide. This collection comprised the first complete skeleton of *Diprotodon australis*, a gigantic marsupial considerably exceeding the rhinoceros in size, the remains of a giant wombat as large as a half-grown bullock, several kinds of colossal birds equalling in stature the Moa of New Zealand, and several species of gigantic kangaroos!

As may be gathered from the views here expressed, I am a thorough disciple of Darwinism in the higher sense of that term. I do not think it is possible to explain on any other hypothesis the wonderful variety and complexity of living forms that inhabit this beautiful world of ours. We must, as it seems to me, acknowledge, with the author of 'The Origin of Species,' in one of his later works, that "man, with all his noble qualities, with sympathy which feels for the most

* Dr. Stirling writes ('Proc. Zool. Soc.,' 1893, p. 474): "Professor Tate informs me that the geological formation of this salt-lake district of South Central Australia must be considered Pliocene. Lake Mulligan is, like Lake Eyre, Lake Frome, and other neighbouring lakes marked in this map, a vast level expanse of salt-encrusted, black mud, only becoming filled after very heavy rains, which are not of very frequent occurrence. Lake Mulligan is relatively small, being only about eight miles across, and the *Diprotodon* remains are somewhere about midway between the east and west edges."

debased, with benevolence which extends not only to other men but to the humblest living creature, with his godlike intellect which has penetrated into the movements and constitution of the solar system—with all these exalted powers, man still bears in his bodily frame the indelible stamp of his lowly origin." I do not accept, however, as many do, the purely materialistic theory, because I am a believer in the truths of revelation and in the spiritual destiny of man. As that of a humble worker in the field of science, earnestly seeking the truth, this is, so to speak, and as I have avowed before, my confession of faith as a naturalist. To adopt Mr. Wallace's admirable language on this point, I am "thus relieved from the crushing mental burden imposed upon those who—maintaining that we, in common with the rest of nature, are but products of the blind eternal forces of the universe, and believing also that the time must come when the sun will lose his heat, and all life on the earth necessarily cease—have to contemplate a not very distant future in which all this glorious earth—which for untold millions of years has been slowly developing forms of life and beauty, to culminate at last in man—shall be as if it had never existed; who are compelled to suppose that all the slow growths of our race struggling towards a higher life, all the agony of martyrs, all the groans of victims, all the evil and misery and undeserved suffering of the ages, all the struggles for freedom, all the efforts towards justice, all the aspirations for virtue and the well-being of humanity, shall absolutely vanish, and, 'like the baseless fabric of a vision, leave not a wrack behind.' As contrasted with this hopeless and soul-deadening belief, we, who accept the existence of a spiritual world, can look upon the universe as a grand consistent whole, adapted in all its parts to the development of spiritual beings, capable of indefinite life and perfectibility. . . . We thus feel that the Darwinian theory, even when carried out to its extreme logical conclusion, not only does not oppose but lends a decided support to a belief in the spiritual nature of man. It shows how man's body may have been developed from that of a lower animal form under the law of natural selection; but it also teaches us that we possess intellectual and moral faculties which could not have been so developed, but must have had another origin; and for this origin we can only find an adequate cause in the unseen universe of Spirit."

OUR VANISHING FORMS OF BIRD LIFE.

To a naturalist there is, perhaps, nothing more melancholy than the wiping out or total obliteration of any living species from this fair world of ours. That this process has been going on from time immemorial—races of animals and plants, under some inscrutable law of nature, vanishing from our planet altogether, their places being occupied by others apparently better suited to the changed environment—is known to every student of natural science. The fossiliferous rocks reveal to us the unmistakable truth that these changes in the living population of the earth during its past history "have been effected, not by the sudden replacement of one set of living beings by another, but by a process of slow and gradual introduction of new species, accompanied by the extinction of the older forms." But we also know that, as we are accustomed to measure time, forms of animal life are long persistent; and, accordingly, it is when a species becomes extinct within the memory of man—suffers, as it were, a violent death and passes away into oblivion under our very eyes—that the force of this truth comes home to us. We then seem to realise that a form of life which it has taken perhaps ages to develop has passed out of existence, and that a gap has been made in the wonderful network of organic being which the ages to come, under the changed circumstances of existence, will be unable to repair. The conditions of life all over the world are so rapidly changing, with the spread of mankind and the growth of modern civilisation, that the displacement or extirpation of native species goes forward at a rapidly progressive rate. The result, in that respect, of the occupation or colonisation of new countries, during the last fifty years, bears witness to the truth of this. One or two instances will suffice. Fifty years ago the quagga, a species of zebra, was the commonest wild animal in South Africa,

abounding on every plain and valley throughout that extensive region. Till recently, two living representatives—the only known survivors of the race—were kept in captivity, but these have now gone, and the species is extinct! Within the memory of man the buffalo roamed in hundreds of thousands over the boundless prairies of America. Where are they now? To quote a vigorous writer—"What would not an enlightened administration in Washington now give to recall alive to the vast plains of the West those glorious herds of Nature's cattle which were their ornament and their wealth? Nothing remains of them to-day except their horns sadly bleaching by the side of rail and roadway. The heedless egotism of the Yankee pioneer and settler has for ever banished from the American landscape its noblest and most interesting adornment, and, except a few miserable specimens kept half tame in the Yellowstone Park, nothing is now to be seen of the proud, free and handsome North American bison." The same thing is happening to-day with the noble elephant of Africa. Through the reckless slaughter by so-called sportsmen, and the traders' insatiable greed for ivory, this "colossal race of an antique world" is fast being hurried to its doom. Unless there is speedy intervention to save the elephant, "the Libyan forests, which furnished the armies of Carthage," will soon be silent, and the noble beast will pass away from the Veldt as completely as the bison has done from the American prairie. And so with birds of different kinds all over the world. Species that even twenty years ago were plentiful are becoming scarcer every year, and many of them will be entirely extinct before the present generation of man has passed away. It is the fashion with naturalists to mourn over the extinction of the Dodo, which abounded on the Island of Mauritius in the early part of the seventeenth century, and to bewail the extermination of the Great Auk, or Gare-fowl, which existed in Iceland at one time in countless numbers, and did not become extinct till about 1844. So keen, indeed, is the regret as to the latter, and so eager the desire of collectors to possess some relic of a vanished form, that I have known as much as £300 paid for a single egg of this ungainly bird. But how few of us realise fully what is happening around us in our own favoured Colony! Look at our native birds. Not very long ago I received a letter from a leading naturalist on the Continent, in which he says: "I have always regarded the avifauna of New Zealand as the most interesting in the whole world. I was, therefore, delighted to read your spirited appeal to the authorities to do something, if only to save a remnant of it; and, failing that, to get representative collections in all the local museums before it is too late. The cost of this great and imporant work would be comparatively trifling—less, in fact, than the expense of equipping a small gunboat for active service in your waters." And this estimate of the New Zealand Avifauna is no mere figure of speech. It contains so many anomalous genera—so many types of ancient forms or connecting links with a fauna of the past—that its study is of the highest interest to the philosophic naturalist. And what is happening at this moment? All the more interesting of these forms are passing away! Not a few species have already been exterminated, many more are on the borderland, so to speak, of final extinction, and some even of the commonest birds of five-and-twenty or thirty years ago have become so scarce that it is difficult to know where to look for them. The saddest part of it is that it seems hopeless now to arrest the evil. After much supine neglect, the Government was at last roused to take action, and, by extending the provisions of the 'Wild Birds Protection Act,' it shielded, to some extent, species that were being indiscriminately destroyed; but those most in need of protection have become exposed to the deadliest of natural enemies by the introduction, at the instance of a former Government, of stoats, weasels and ferrets—bloodthirsty animals that are now swarming over every part of the country and defy all attempts to check their increase. The intention, of course, was to find some remedy for the wild-rabbit nuisance; but it is notorious that these marauders will not take fur when they can get feather. From all parts of both Islands I have received intelligence of the ravages of these animals, and, being now thoroughly established in the country, it will be impossible ever to eradicate them.

From a naturalist's point of view, I regard this act in the light of a crime. The vermin that every farmer in the Old Country was trying to extirpate as an unmitigated evil, our misguided Government bought up by the hundred and imported into New Zealand, in the vain hope that these carnivorous beasts would change their habits and take to a rabbit diet, to the exclusion of everything else! No doubt, to abate the rabbit nuisance, which was causing widespread loss and even ruin to our sheep-farmers in many parts of the country, was a most desirable object. But it is a question whether, in the introduction of stoats, weasels and ferrets, the Government was not establishing, even from the farmers' point of view, a still greater evil. As shipment after shipment of these vermin from over the water arrived in New Zealand, I raised my voice in protest against so insane a policy, and so did others—notably Professor Newton, of Cambridge—but all to no purpose. The imported animals were turned loose north and south, and have now become firmly acclimatised in a country where the conditions of life are so favourable to their existence that no power on earth will ever dislodge them. The Wairarapa was the principal seat of the rabbit plague in the provincial district of Wellington; so the destroyers, of whom so much was expected, were liberated there. But they did not stay long with the rabbits. Swarming over the dividing range, and crossing in summer the snow-capped ridges of the Ruahine, they descended upon the fertile lands of the west coast, where they are now fairly established, and where there are practically no rabbits for them to prey upon. They are making themselves felt, however, in other respects. The rabbits devastated the pastures, but they left the sheep alone. Not so with these "Government immigrants." One farmer at Kereru complained to me that in a single night in one season he lost forty lambs, each exhibiting a small punctured wound, betraying the depredator. The breeding of Turkeys was at one time a profitable industry in these districts, the hen-birds forming their nests in the scrub and along the outer edges of the bush; but, with these marauders abroad, a Turkey has now very little chance of bringing out a brood. Formerly, the Wood-hen (*Ocydromus greyi*) was very abundant in the Horowhenua and Manawatu districts, its loud and not unmusical whistle being heard on all hands as the shades of evening deepened into the gloom of night. Now all this is changed. The responsive cries of the Wood-hen are seldom heard, and there is nothing to break the stillness of the night but the call of the Morepork keeping his vigils. The diminution in numbers of our introduced game—Pheasants and Californian Quail—must, I think, be attributed to the same cause.

In various volumes of the 'Transactions of the New Zealand Institute' I have published a mass of evidence showing how destructive this new factor has proved.

It is melancholy to reflect that the New Zealand avifauna, which had already, from a variety of adverse causes, become endangered, should be thus subjected to an overwhelming influence for evil. But for this unfortunate introduction there would have been some hope of many of the species being permanently preserved. Indeed, it had become a subject of remark that such birds as the Wood-hen, the Swamp-hen, and the Banded Rail, were becoming more numerous in all the cultivated districts, the conditions of existence being more favourable.*

* To show that I am not raising an unnecessary wail over the birds that are vanishing, I will quote a passage from Professor Newton's admirable article on 'Birds' in the *Encyclopædia Britannica* (p. 742):—"As a whole, the avifauna of New Zealand must be regarded as one of the most interesting and instructive in the world, and the inevitable doom which is awaiting its surviving members cannot but excite a lively regret in the minds of all ornithologists. This regret is quite apart from any question of sentiment; if it were otherwise, it could not be defended against that sentiment which prompts our colonial fellow-subjects indiscriminately to stock their fields and forests not only with the species of their Mother-country, but with all the fowls of heaven, whencesoever they can be procured. The regret we express arises from the thought that, just as we lament our ignorance of the species which in various lands have been extirpated by our forefathers, so our posterity will want to know much more of the present ornis of New Zealand than we can possibly record; for no one nowadays can pretend to predict the scope of investigation which will be required, and required in vain, by naturalists in that future when New Zealand may be one of the great nations of the earth."

Let it be understood, therefore, that many of our indigenous species are hopelessly doomed; and every true naturalist must grieve over it, as an irreparable loss to science, for some of them are the relics of perhaps the oldest fauna now living on the earth.

As I have pointed out elsewhere, looking to the fragmentary character of the New Zealand fauna generally—the almost total absence of Mammalia and Amphibia, the phenomenal development of wingless birds that existed till quite recent times, and are now represented by the various species of Apteryx and the highly specialised forms of non-volant Rails, besides the many other endemic genera of land birds, and the great paucity of reptiles and insects—we must conclude that it is but the remnant of an ancient fauna, perhaps the most ancient in the world, which formerly occupied a very much wider area of the earth's surface. I never write on this subject without thinking of the words of my friend, Professor Newton, of Cambridge, in an address which he gave to the British Association in 1887. Referring to the rapid extinction, even at that time, of many of the New Zealand birds, he said: "I would ask you to bear in mind that these indigenous species are, with scarcely an exception, peculiar to that country, and, from every scientific point of view, of the most instructive character. They supply a link with the past that, once lost, can never be recovered. . . . The forms that we are allowing to be killed off, being almost without exception ancient forms, are just those that will teach us more of the way in which life has appeared on the globe than any other recent forms."

Among the species that have actually become extinct since the colonisation of these islands must be placed, first and foremost, the New Zealand Quail. It is difficult now to form an idea of the extreme abundance of this fine bird in all suitable localities in the early days of settlement. Sir David Monro recorded having shot forty brace in the course of an afternoon in the suburbs of Nelson, and, at that time, the bird was equally abundant in Canterbury. The introduced Brown Quail of Australia is often mistaken now by the settlers for the indigenous bird, to which it bears a general resemblance, but no specimen of our true Quail has been heard of for close on five-and twenty years. The regret one naturally feels at the loss of this form is tempered by the fact just mentioned that in Australia we have still surviving a species (*Coturnix pectoralis*) so nearly allied to our bird that it takes the eye of an expert to distinguish them. Another bird which is verging on extinction, if not already extinct, is the celebrated *Notornis mantelli*, of which only four perfect specimens have been obtained, a period of thirty years intervening between the capture of the first and the third, and a further period of nearly twenty years before the capture of the last. It may yet linger in the interior of the South Island, but with the spread of settlement that hope is becoming every year a more slender one. It is a huge flightless brevipennate Rail, little adapted by nature to cope with the new conditions of existence.

Another Ralline form, the Wood-hen, which till within the last few years was extremely abundant in all parts of the country, is fast following suit. There are five recognised species in New Zealand, and of these, the one formerly inhabiting the Canterbury Plains (*Ocydromus australis*) was probably the most abundant. The North Island Wood-hen (*Ocydromus greyi*) was also very plentiful in all suitable localities. It was always the first visitor to the settler's tent, and its shrill cry—exactly like that of the European Curlew—was one of the most familiar of country sounds, especially towards evening. Now in most parts of the country its voice is seldom or never heard; it is becoming an extremely scarce bird, both North and South, whilst from some districts, where it formerly abounded, it has entirely disappeared. For a time the conditions of settlement appeared to be favourable to its existence, and it was perceptibly increasing, but the introduced natural enemies have proved too much for it, and the wholesale use of poisoned grain for the destruction of wild rabbits in all the settled districts has become another factor in its rapid extermination. This is much to be regretted, for, from a scientific point of view, the Wood-hen is a most interesting bird. It is furnished with ample wings, but, owing to their peculiar construction, they are useless for purposes of flight; and, under the new conditions of life, the

struggle for existence has, as might have been expected, proved too severe for these flightless forms. Mr. Morgan Carkeek, the well-known surveyor, on his return from a two months' exploration in the interior of the Marlborough district, informed me that during the whole time he had met with only a single Wood-hen, whereas only a few years before these birds swarmed there. This is one of the peculiar forms which a naturalist is very loth to lose sight of. The only approach to it anywhere else is the Wood-hen of Lord Howe Island, which Dr. Sharpe proposes to put into the same genus as the flightless Rail (*Nesolimnas dieffenbachi*) of the Chatham Islands, which appears to have become extinct some fifty years ago. Professor Newton, I may here remark, was the first to point out that the New Zealand Wood-hen and the Dodo of the Mauritius are the only two known forms (excepting, of course, the Struthiones) in which the angle formed by the axes of the coracoid and scapula is greater than a right angle—a feature of such importance that Professor Huxley afterwards adopted it as one of the distinguishing characters in his proposed scheme for the classification of birds, under the two divisions of Carinatæ and Ratitæ.

Of the vanishing forms of bird-life, however, the most interesting, no doubt, are the various species of Apteryx or Kiwi. These are practically wingless birds, belonging to the great natural sub-class of Palæognathæ—which embraces the Ostriches and Cassowaries—and they are so anomalous in structure and so specialised in their generic character that no general treatise on birds is deemed complete unless it contains an exhaustive account of them. In his masterly memoir on the anatomy of Apteryx, the late Professor Owen wrote: "The Apteryx presents such a singular and seemingly anomalous compound of characters belonging to different orders of birds as may well make the naturalist pause before he ventures to pronounce against the possibility of a like combination of peculiarities in the historical Dodo." The Professor lived, however, to describe the greater part of the osteology of *Didus ineptus*.

And not less important among these vanishing flightless birds, we have the Kakapo, or great Ground-parrot, a bird furnished with excellent wings, but with their muscular mechanism so atrophied by long disuse that they are useless for purposes of flight. This bird, too, is nocturnal, and, being unable to fly, is being rapidly extirpated by the same agencies as the rest. A few years ago this handsome Parrot was excessively abundant in the dense woods covering both slopes of the Southern Alps and in all the West Coast Sounds, but now it is rarely heard of. The late Sir Julius von Haast, during his exploration of the Canterbury portion of that mountainous region, made a special study of its habits. He published the results in a very interesting paper, which appeared first in the 'Ibis,' and was translated therefrom into several foreign languages. The birds are strictly nocturnal, and repose during the day in underground holes or in hollow logs, so that they are specially accessible to wild dogs and cats and to the introduced marauders of which I have spoken. The Kakapo was so numerous in Haast's time that, for many months together, it formed the staple item in the bill of fare of his exploring party. Later on hundreds of skins were sent to Europe by the bird-dealers. Now it is a rare thing to see a specimen of it in the market. One remarkable point in the structure of this bird is that the sternum, which in other birds of its class has so prominent a keel, is so completely altered that it presents almost a flat surface, although the symmetry of the skeleton does not appear to have suffered in any other respect. Its variegated yellow and green plumage so closely harmonises with the vegetation among which it lives that in the daytime it is almost impossible to distinguish it when at rest—a beautiful illustration of the law of assimilative colouring for protective purposes.

In the North Island we have the beautiful Huia (*Heteralocha acutirostris*). This bird, of the size of a Crow, has glossy jet-black plumage with white-tipped tail-feathers and ivory white bill. It presents to us a structural feature quite unique among birds, inasmuch as the sexes have differently shaped beaks—that of the male being strong and wedge-shaped, like the bill

of a Woodpecker, that of the female long, slender and semi-circular—a modification of structure adapted to the natural economy of the species—and explainable only on the Darwinian principle of natural selection. The Huia, which is greatly prized by the Maoris on account of its tail feathers—for personal adornment and as a badge of tribal mourning—has, from time immemorial, been confined to a narrow strip of wooded country (mostly mountain) forming part of the old Wellington Province. It is one of the doomed species, as I shall presently show.

The Huia loves the mountain tops, but it is driven down by the cold in winter to the lower forests. These are quickly disappearing before the woodman's axe in the rapid progress of settlement. The home of the bird is invaded, and the struggle for existence is becoming every day more severe. In spite of the protection extended to this species by the Government—at the request of Lord Onslow and as a compliment to his family—this beautiful bird is doomed, and a few years hence it will be among the things that were. The best chance of preserving a remnant would be, as was intended by the late Mr. Ballance, to snare a sufficient number and turn them out on the island reserves. The bird is too weak-winged to return to the mainland, and, under favourable conditions would, I am sure, thrive and do well in its new environment.

Nearer still to the border line of final extinction comes the Stitch-bird (*Pogonornis cincta*)—a form which, strange to say, approximates to *Ptilotis*, a decidedly sub-tropical genus. This bird is quite unique, in its beauty, among the generally sombre-coloured birds of our avifauna. The male has a jet-black head and neck, with two white tufts projecting from the crown, and a belt of golden yellow on the breast, spreading into epaulettes on the wings. As with many tropical species—but a novel character with our birds—the female has an entirely different plumage, being dull olive green and brown. Thirty-five or forty years ago the Stitch-bird was extremely common in the southern parts of the North Island. It had long before disappeared from the forests of the far North, but, curiously enough, a remnant continued to exist on the Little Barrier Island, in the Gulf of Hauraki, which, as already stated, has now become a Government "bird reserve." Owing to its market value, it is said that about 150 specimens were taken from this island by Reischek and other collectors before the date of the proclamation ; but let us hope that the protecting hand of the Government has not been extended too late to save the species. In its native home, and under favourable conditions, a few pairs would suffice to stock the island again in the course of, say, ten or fifteen years.

But others of our formerly commonest birds are getting scarce. Our Wood-pigeon—the largest and handsomest of the group of Treronidæ, or Fruit-eating Pigeons, to which it belongs—was diminishing so rapidly all over the country that the Legislature, very wisely, passed a special Act, making the year 1896 and every sixth year thereafter, a strictly close season for this bird. The protection is a step in the right direction, and although we may not be able to reach all the influences that are in operation, the strong arm of the law will add to the chances of existence. It is, of course, the apterous and ground-feeding birds that suffer most from the depredations of stoats, weasels and polecats ; but we have undoubted proof that, in the Upper Wanganui and Tongariro country—where these animals abound in great numbers—the Pigeons, which habitually roost in low trees, suffer severely from them. The marauders, which are nocturnal in their habits, climb the trees at night, and attack the Pigeons in their sleep for the purpose of sucking their blood. The numberless bodies of Pigeons found lying in the woods punctured in the neck sufficiently attest the fact.

Among the small native birds, three species have become practically extinct in the North Island, although still existing on the Little Barrier Island at the north, and on the Island of Kapiti, in Cook Strait. I refer, of course, to the Bell-bird, the native Robin, and the White-head. In the South Island and in Stewart's Island the Bell-bird, the most charming of our native songsters, is still plentiful, and there are also representative species of the two other forms.

The question naturally arises, to what is the disappearance of these actively volant birds due? The introduced rat has no doubt been a potent factor in this business; and the Maoris believe that the bees, by taking possession of the wild flowers, have driven out the birds. But there are doubtless other causes at work, of which we have at present no certain knowledge.

There can be no doubt that the introduction of foreign birds has in a great measure contributed to this result. The incomers, profiting by the new conditions of life, have displaced many of the indigenous species. I was much struck with this on one occasion just before my departure from New Zealand, when, on a visit to the inland township of Levin, I took a stroll through the beautiful clump of native bush still standing on the Native Reserve adjacent to the settlement. How changed everything was now from what it was a few years ago! Instead of the song of native birds, you have on all hands the familiar notes of the Sparrow and the Greenfinch, the Linnet and the Goldfinch. Nothing else of the native element remained but the soft trill of the Grey Warbler, warbling to himself in the underwood. I could scarcely realise the complete change and could quite appreciate the Maori's pathetic reference to it when he remarked, "So is the Pakeha replacing the Maori on the lands of our ancestors!" For a short time certainly there was a Tui singing gaily in a lofty tree-top; and then, moved by some sudden impulse, he darted downwards, passing through a sunlit glade in the forest, his white epaulettes shimmering in the light. Then all was silent again, save for the lively twittering of the Sparrow and his foreign friends.

Whether the various Acclimatisation Societies have always exercised a wise discretion in the birds they have chosen to introduce remains yet to be proved.*

* There has been much heated discussion, for example, over the question of introducing the House Sparrow. If the importation was in reality a bad one, I must take my share of the blame that attaches to it, for I was an active member of the Council of the Wanganui Acclimatisation Society, which was the first body, I think, to move in this matter in 1865-6. All I have to urge in defence of the poor, persecuted *Passer domesticus* will be found at pages xliv. to xlvii. of my Introduction to vol. I. But I take this opportunity of reprinting the observations on this point of a very thoughtful local observer, Mr. W. W. Smith: "In the early days of the colony vast swarms of caterpillars infested the open grassy country, living in the dense tussock (poa). In a few years, after the annual burning of the sheep-runs commenced, the caterpillars disappeared from the plains and attacked the cereal crops, working great destruction among them. Some years after the introduction of the House Sparrow, which increased at an unprecedented rate, the caterpillars were soon reduced in numbers, and are now no more trouble to the agriculturist. They were the larvæ of the Yellow-underwing moth, still to be obtained feeding on the introduced Cape broom. The species would unquestionably increase, and probably again become troublesome to farmers, but for the presence of the House Sparrow, which hunts vigorously in the hedges for the larvæ, and keeps them in check." But, whether a fortunate importation or not, the Sparrow has come to stay! The persistency with which this ubiquitous bird asserts itself in all parts of the world is something quite astonishing. In New York it is now as numerous as elsewhere. I was amused on visiting the Central Park at seeing what a singular spot a pair had selected for their nest. There is, as all visitors to the Park are aware, standing in a commanding position, a colossal bronze statue to the memory of Daniel Webster, the American patriot. In the half-closed left hand the birds had found a convenient and sheltered receptacle for their nest; and the ends of straw and other loose materials of which it was composed could be seen dangling from the patriot's wrist at every point of view! But the English Sparrow is not to be outdone in enterprise of this kind, and indeed, "goes one better" than his Trans-Atlantic cousin; for, at a later date, I noticed that the bronze statue of George Canning, standing in Westminster Place, opposite to the Houses of Parliament, had been utilised in the same manner, and that the Sparrows had found accommodation there for two nests—one being placed in the fold of the robe above the right hand and the other in a similar cavity under the wrist. And here, when I saw it (summer of 1900), two young broods of Sparrows were being cradled in the midst of English politics! And, not content with this, they have appropriated, as a nesting place, the clock of the parish Church of St. Matthew, in Bethnal Green. In the face are two small holes which afford the Sparrows ingress; and the nesting operations within the clock do not appear to have affected in any way its normal working.

Before hastily condemning the Sparrow in New Zealand, I should like his judges to read the testimony of the late Mr. W. T. L. Travers, in his last communication to the Wellington Philosophical Society. In retiring from the office of President, he referred to the inaugural address delivered by himself, a year before, under the title of 'The Bird as

There is just the chance that, in the course of time, some of these vanishing species may learn to adapt themselves to the new condition of things, and take a fresh lease of life. I will give an illustration of my meaning. The Tooth-billed Pigeon (*Didunculus strigirostris*), a native of the Samoan or Navigator Islands, was supposed to be rapidly becoming extinct, as its terrestrial habits rendered it an easy prey to predatory animals, such as cats and rats, introduced into the islands from European vessels; but late accounts show that it has changed its habits, feeding or resting exclusively on large trees, and that it is now increasing in numbers. Commenting on this, a leading scientist says: "It is in this way, through the struggle for existence, that habits which have been transmitted from parent to offspring through unknown generations are suddenly abandoned, and entirely opposite ones adopted that give the needed protection to life and continued prosperity, which the inherited methods no longer are able to secure." Now, singularly enough, one of the three species mentioned above, the Whitehead (*Clitonyx albicapilla*) was forty-five or fifty years ago the commonest bird in the North Island, and at that time a strict inhabitant of low scrubby vegetation, where its habits were gregarious. For many years it seemed to have become extinct, Mr. Reischek, during several years' hunting in the woods of the Auckland district, never having met with a single example. During late years it has reappeared, but in an entirely new character, as the frequenter of the highest tree-tops, and it appears to be sensibly increasing. On the Little Barrier, however, where it has never been much disturbed, it still continues to frequent the low vegetation.

Among recently vanished forms of very high interest I ought to refer to an aberrant form of Ground-wren, constituting a genus by itself (*Traversia*), discovered only a few years ago on Stephen's Island, and now unhappily—through the greed of natural history collectors—absolutely extinct.

Other expiring forms might be indicated; but I think I have said enough to show that in New Zealand we possess an endemic fauna of great scientific interest, and that, for the credit of our race, it behoves us to do all in our power to preserve what we can of these interesting forms of life.

THE PASSING OF OUR FORESTS.

Rudyard Kipling, who is as well travelled as most men, declares that New Zealand is the most lovely country on the face of the earth. If this be true (and personally I agree with him) there can be no doubt that no small share of that loveliness is due to the evergreen vegetation

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the Labourer of Man' ('Trans. N. Z. Inst.,' vol. xxxv., p. 1), which consisted chiefly of a vindication of the Sparrow and a protest against "the mistaken crusade against small birds"; and he then said that his contention had received the amplest confirmation in the late bountiful harvest in the South Island. Never had the birds been more numerous, or the complaints of the "pests" more bitter, yet the yield of grain was absolutely without precedent, and to the birds who had destroyed the natural enemies of the corn the credit was due. But the agriculturists had again justified Virgil's old complaint of the "greedy husbandman" who grudged his best friends the well-earned toll they exacted for their services.

This self-assertive little bird, in spite of much persecution, holds his own in most countries; and in England, since the abolition of Sparrow Clubs, he has had, on the whole, a very good time of it. I remember, some years ago, being very much interested in seeing some hundreds of Sparrows repair at noon to the Gardens of the Tuileries, in Paris, to be fed by an eccentric visitor who had made it his chief pastime for years, the birds perching on his head and shoulders, and crowding round him in perfect confidence. The Sparrow's triumphant victory in Hungary, where, years after his banishment, he had to be re-introduced at the cost of the State, to contend against the insect pests in that country, is a matter of history. In generous England he has lived down the old prejudice and has even achieved Royal consideration! The writer of an article in the *Cornhill Magazine*, dealing with our common birds, says: "Are we not all one at heart with that owner of a palace who for a whole season admitted his guests by a side entrance, a Wren having built her nest in the hinges of the great gate during its temporary disuse? Was not even a Sparrow's untidy nest left untouched this year because it had built in the crown upon His Majesty's gate at Sandringham?"

which is so predominant a feature. The majestic and silent forests of 'kauri' conifers and 'kahikatea' pines; the compact tracts of 'rimu' and 'totara,' each possessing a distinctive beauty of its own; then the mixed trees in endless variety, many of them laden with luxuriant epiphytic growths; the semi-tropical richness of the underwood in its varying shades of green and brown, with its ever-present glory of tree-ferns of every sort, and its endless tangle of 'kareao' vine; all these are marked characteristics of the New Zealand bush. The red blaze of the 'rata' at Christmas-time; the never-ending coils of 'kiekie,' as it spreads from tree to tree, its long cutting leaves hanging in graceful bunches and covering the boles of the trees with a waving mass of vivid green; the garlands of 'pikiarero,' or star-like *Clematis*, hanging in festoons from the tops of the lower trees; the trailing and clinging masses of 'tataramoa' and scented 'kohia'; the ever-spreading carpet of ground ferns and mosses and other cryptogamic plants; the climbing *Convolvulus* covering the shrubs on the outskirts of the forest as with a close-fitting mantle; the groves of lily-palms or "cabbage trees" in the open, and the stately 'nikau' in the shade of the gully; the clumps of white-flowering *Scoparium*, and the far-reaching fields of *Phormium tenax;* all these are evidences of an endemic and interesting flora, flourishing under the best climatic conditions. Such indeed is the native "ngaherehere"—a sylvan medley of matchless beauty, the colours blended by Nature's master-hand, and presenting a harmonious whole of which the eye never tires!

The luxuriance of the vegetation in the virgin forest, all untouched by the hand of man—as seen most favourably when a newly-cut road opens up the forest—baffles description. But all this natural beauty is passing away! The woodman's axe and the settler's fire-stick are doing their rapid work of destruction, and a few days will generally suffice to reduce to ashes what has perhaps taken centuries to bring to this state of perfection. This reckless destruction has been carried on wholesale in the past, no less than one hundred thousand acres of bush, in one district alone, having been, within my own knowledge, swept clean in a single season.

It will be seen from what I have already advanced that the natural beauty of our forests invests them with a sentimental value which ought to count for much in estimating the assets of the country. But, quite apart from this, the native forests have an economic value that cannot well be over-rated. No one would wish to see the profitable settlement of the country arrested; and the first condition of this, of course, is that the land be cleared. What is objected to is the wholesale and indiscriminate destruction. And here it is that the protective hand of the Government has of late years asserted itself, securing for the Crown suitable and inalienable reserves where required for scenic or economic purposes.

Sir John Lubbock (now Lord Avebury) writes, in his 'Beauties of Nature' (page 183): "The reckless and wanton destruction of forests has ruined some of the richest countries on earth. Syria and Asia Minor, Palestine and the north of Africa, were once far more populous than they are at present. They were lands 'flowing with milk and honey,' according to the picturesque language of the Bible, but are now in many places reduced to dust and ashes. Why is there this melancholy change? Why have deserts replaced cities? It is mainly owing to the ruthless destruction of the trees which has involved that of nations. Even nearer home a similar process may be witnessed. Two French departments—the Hautes and Basses-Alpes—are being gradually reduced to ruin by the destruction of the forests. Cultivation is diminishing, vineyards are being washed away, the towns are threatened, the population is dwindling, and unless something is done the country will be reduced to a desert; until, when it has been released from the destructive presence of man, Nature reproduces a covering of vegetable soil, restores the vegetation, creates the forests anew, and once again fits these regions for the habitation of man. In another part of France we have an illustration of the opposite process. The region of

the Landes, which fifty years ago was one of the poorest and most miserable in France, has now been made one of the most prosperous owing to the planting of pines. The increased value is estimated at no less than 100,000,000 francs. Where there were fifty years ago only a few thousand poor and unhealthy shepherds, whose flocks pastured on the scanty herbage, there are now saw-mills, charcoal kilns, and turpentine works, interspersed with thriving villages and fertile agricultural lands. In our own country, though woodlands are perhaps on the increase, true forest-country is gradually disappearing. This is, I suppose, unavoidable, but it is a matter of regret. Forests have so many charms of their own. They give a delightful impression of space and of abundance."

There are many things in which we may take useful lessons from the Germans, and not the least of these is in the State management of the forests. As Mr. Michael Morrison informs us, for many years past a very conservative policy has been pursued by the various German States with regard to their woods and forests, which are looked upon as one of the most important assets of the country. For thirty years or more the art of forestry has been practised by all the States with a skill and with an application of scientific methods to practical details which are bound in the end to secure complete success. This proceeds on the knowledge that nothing affects climate more than the presence of large forested districts, both by offering protection against inclement winds and by their influence on the humidity of the atmosphere and soil. In Germany the State does not permit the private owner of woodlands to do as he likes with his own. While allowing him a certain amount of freedom in planting and deforesting, it exercises everywhere a wholesome control, so as to prevent his doing anything that might, in a general way, injure the district; in fact, treating the freeholder as if he were only an occupier. His woods are of importance not for him alone, or merely for the present time, but for the entire community and for all time. Owing to the complete deforesting of large tracts on the northern sea-coast in the eighteenth century, an extensive shore-line was exposed to the prevailing sea-winds, and the sand dunes which were kept back by the forests have now so far encroached that they cover the sites of once populous and flourishing villages, and are threatening to choke up in time the estuaries of numerous streams.

There are tens of thousands of acres of Crown lands in New Zealand that are capable of being afforested; and, from every point of view, there could not be a better or more profitable investment of public funds.*

* On the principle of giving "honour where honour is due," I am glad to place on permanent record the following extract from a newspaper article which appeared in the Colony in September, 1893:—"For several years Mr. R. M'Nab, M.H.R., has been foremost in the House in urging upon the Government the necessity of taking active steps to preserve the native flora and fauna of New Zealand, and to protect for future generations to enjoy, some of the picturesque stretches of river scenery which are in danger of destruction. The member for Mataura has gone further than others who support him in this matter, and has put forward many practical suggestions. A return to his order was furnished to the House yesterday, and shows the condition of affairs in some districts. In June of 1902, the conference of New Zealand horticulturists, which met at Dunedin, passed a resolution deploring the vandalism which was destroying the flora of the colony, and asking the Government to step in. Questions were formulated and sent to the various Commissioners of Crown Lands, asking what had been done in the way of conserving the forests on the upper reaches of the rivers and streams to ensure water supplies, and distribute the rainfall; the destruction of the hills; and conserving stretches of river banks and beauty spots. Mr. Mackenzie (Taranaki) attributes the fertility of that province to the copious rainfall caused by the position and altitude of Mount Egmont. A half-mile strip along the banks of the Mokau is advocated for scenic purposes, and Mr. Mackenzie commends the work done by his predecessor, and says if it is thought lightly of and neglected, in fifty years' time much, if not all, of what was once lovely, beautiful and characteristic of New Zealand bird and forest life, will be gone for ever, and referred to as matters of history only. It is needless to say that, once gone, there will be but little chance of ever replacing it, at any rate quite impossible in its old primeval grandeur."

THE VALUE OF STATE PROTECTION.

The Seddon Government, whatever it may have done or left undone, has at any rate established this claim on the gratitude of posterity, that it has accomplished more than any other Colonial Government, in New Zealand or elsewhere, in the way of conserving the native fauna and flora. During their ten years or more of office, Ministers have taken several important steps in that direction, culminating at last in the adoption of a Parliamentary measure ('The Scenery Preservation Act, 1903') providing for the conservation and maintenance of native scenery, and appropriating £100,000 for the acquisition of land by the Crown where necessary for that purpose.

The first forward step was taken by my personal friend, the late Mr. John Ballance (the then Premier), who, in 1892, responded promptly to the request of the Earl of Onslow, the Governor of the Colony, that two suitable islands should be acquired by the Crown—the Little Barrier in the North and Resolution Island in the South—and set apart as public reserves for the conservation of the indigenous fauna and flora.* His Excellency, in a Memorandum of considerable length, which was afterwards laid before the local Parliament, directed the attention of his Ministers to the fact that many of the native species, under the changed conditions of existence, were passing away; that some had already disappeared, while others were verging on extinction. He mentioned that many prominent writers on zoological science had urged the importance of taking some steps for the preservation of New Zealand birds, and had pointed out that it would be a lasting reproach to the present generation of colonists if no attempt was made to save some—if only a remnant—of these expiring forms, for the student of the future. After putting forward many cogent reasons, Lord Onslow concluded his argument in these words: "Looking to the interests involved—the great loss to the scientific world implied in the extermination of natural forms that do not exist elsewhere, and the importance therefore of saving them—it cannot be denied that a heavy responsibility rests on those who, while there is yet time and opportunity, may neglect to take the necessary steps for their preservation."

The Hon. Mr. Ballance earned for himself the thanks of ornithologists everywhere by taking prompt action, on the Governor's recommendation, in setting apart the required island-reserves, and in making arrangements for having them stocked with birds and plants from the mainland, and placing them in charge of competent rangers.

As His Excellency was good enough to honour me with his personal confidence during the whole of this important negotiation, I may be permitted to quote the appeal contained in that Memorandum, invoking the protection of Government for the Huia, our elegant Mountain Starling:

> There is a bird famous in Maori history and poetry—remarkable for its singular beauty, and interesting to naturalists on account of its aberrant generic characters—a species confined to a very limited portion of the North Island, from which, owing to the eagerness of natural-history collectors and the inevitable progress of settlement in its native woods, it is fast disappearing. I refer, of course, to the Huia (*Heteralocha acutirostris*), a bird which is naturally confined within such narrow geographical boundaries that I may describe its range as being limited to the Ruahine, Tararua, and Rimutaka Mountain-ranges, with their

* Some years ago steps were taken by the Seddon Goverment for acquiring from the Maoris the island of Kapiti, in Cook's Strait, to serve as a central depot, and it is to be hoped that this plan will yet be carried into execution. The island is admirably adapted for acclimatisation purposes, having on its surface a fair distribution of forest and fern-land, mountain and valley. Two species of native birds—the Bell-bird and the Whitehead—which for years have been practically extinct on the mainland, are still numerous on the wooded slopes of Kapiti, and it is very delightfu to the casual visitor to hear their joyous notes immediately on landing.

divergent spurs and the intervening wooded valleys. The white-tipped tail-feathers of this beautiful bird have been from time immemorial the chief adornment of Maori chiefs as head-plumes; and an incident connected therewith, in ancient times, led to the adoption of the name by the great ancestors of the Ngatihuia Tribe. As Ministers are aware, when selecting a Maori name for my infant son, to commemorate his New Zealand birth, I was induced, for several considerations, to give this name the preference over all others submitted to me; and I should therefore accept it as a compliment to my family if Ministers would exercise the power they possess, and throw over this bird the shield of Government protection. I ask this the more readily on the ground that I have been moved to do so by the chiefs of the Ngatihuia Tribe. At the public function at Otaki, on the 12th September last, when I had the pleasure of presenting my son to the assembled tribes, a number of very complimentary speeches were made by the leading chiefs, and one of them, in referring to the name, said, "There, yonder, is the snow-clad Ruahine Range, the home of our favourite bird. We ask you, O Governor, to restrain the pakehas from shooting it, that when your boy grows up he may see the beautiful bird which bears his name." The Huia loves the deep shade of the forest, and as its home is invaded by the settler's axe it would, if protected from reckless destruction, simply retire higher up the wooded ranges, till it finally took refuge in the permanent forest reserve, which embraces all the wooded mountain-tops within its natural domain. Under vigilant protection, therefore, the Huia would have every chance of being preserved and perpetuated.

This earnest appeal from Her Majesty's representative happily proved effective, and a proclamation at once appeared in the *New Zealand Gazette*, extending the provisions of the 'Wild Birds Protection Act' to the Huia.

As to the island-sanctuaries, the original proposal was not merely to protect the birds already existing on the two reserves, notably the Stitchbird and the Whitehead on the Little Barrier, and the *Notornis*, the Kiwi, and the Kakapo on Resolution Island; but that many other birds then living on the mainland, although becoming scarcer every year, should be systematically trapped from time to time and turned loose upon the islands. In addition to a further supply of Kiwis and Kakapos, the birds specially marked out for these attentions were the Huia (*Heteralocha acutirostris*) and the Blue-wattled Crow (*Glaucopis wilsoni*) in the North Island; and the Thick-billed Thrush (*Turnagra crassirostris*) and the Orange-wattled Crow (*Glaucopis cinerea*) in the South Island. As pointed out, this could be done then, and at comparatively trifling cost, but that every year it would become more difficult.

All over the scientific world the action of the Government in this matter has been applauded. The efforts now being made, whether in the end completely successful or not, will in any case save us from the reproaches of posterity. If they should prove successful, as I believe they will, I venture to think that this service to science will bring credit and praise to the present Government when many of their more ambitious schemes and projects have been buried and forgotten.

I regard with extreme satisfaction this gradual awakening to the fact that we have animal and vegetable forms of life indigenous to the country which ought to be protected and cherished, that we have bush scenery of matchless beauty that ought to be preserved, and that, new as our record is, we have sites of 'pas' and other places of historic interest that ought, at any cost, to be handed down unimpaired to those who will come after us. That this growing feeling is becoming part of our national life must surely delight every true lover of New Zealand.* The various

* To show that I am not overstating the scenic attractions, amongst others, of the Colony, I quote here from an article that appeared in the 'British Empire Review' as recently as November last: "At this season it is well to call attention to New Zealand as a country which is unrivalled in the variety of its attractions and advantages to those who are contemplating going abroad for the winter. The months from September to May comprise the spring, summer, and autumn seasons in that country. Possessing as it does a brilliant climate, sunny, yet invigorating to all born and bred within the temperate zones, it is a land of beautiful and varied scenery, containing Alpine ranges, with great glaciers, volcanoes, forests, river-gorges, lakes and fiords. It now affords first-rate sport to anglers and deer-stalkers. Its spas and thermal-spring baths are unsurpassed in health-giving qualities, and excellent medical advice can be obtained by

Commissioners of Crown Lands all over the colony have received instructions to withhold from sale spots of exceptional beauty and all places of historic interest—such, for example, as the site of the Orakau Pa, with its tradition of '*Ake, ake, ake!*' (which, by the way, was within a few hours of being sold, when the Government stepped in to save it); and the site of Rangiriri, where the Waikato tribes made their first heroic resistance before surrendering to an overwhelming force, and where so many of our own brave men lie buried. Forest reserves like the beautiful belt of bush along the boundary of the State farm at Horowhenua, are being defined and proclaimed; and the law is being invoked for the protection, one after another, of our rarer species of birds. All honour to the Government that has taken this new departure!

ALBINOES AND OTHER NATURAL FREAKS.

The inherent tendency to albinism is one of the marked characteristics of the New Zealand ornis. Albinism in the human subject is due to the absence of the minute particles of colouring matter in the epidermis or outer cuticle, the presence of which, in more or less abundance, gives colour to the skin. In many species of quadrupeds, birds, and reptiles, albinism, due to a precisely similar cause, often exhibits itself, the skin, hair, feathers, and also the hard tissues—even the horny sheaths and scaly coverings—presenting an abnormal whiteness. Sometimes, as in the case of white rats, mice, and rabbits, this is accompanied by an abnormal condition of the eyes, which become blood-red. The whiteness of plumage, the purity of which is regulated by the entire or only partial absence of the colouring pigment in the feathers, is thus easily accounted for; but I have been unable to discover any sufficient reason for the frequency of this condition of plumage among the birds of New Zealand. It is certainly not the result of disease or of a low state of vitality, any more than albinism in the human subject can be taken to indicate an enfeebled condition of mind or body. May it not then be in some way dependent on climatic conditions? It is a significant fact that in tropical India the tendency is in an opposite direction, melanism, as we are informed, being of frequent occurrence there. Now, in the whole of my experience, I have met with only two examples of melanism among New Zealand land birds—the subjects being *Anthornis melanura* and *Muscitræa albifrons*—and I cannot say that in either case was it very pronounced. Among sea-birds, the only instances I have known were the following: a black Penguin (*Catarrhactes pachyrhynchus*) from the Snares (= *Eudyptes atratus*, Hutton); a similar Royal Penguin (*C. schlegeli*) from Macquarie Island, which I purchased from Mr. Bills, of Dunedin, for Mr. Rothschild's collection; and several examples of *Megadyptes antipodum*, in which the under surface was more or less spotted with black. I have lately heard of a black King Penguin (*Aptenodytes patagonica*), from Macquarie Island, now in the Tring Museum.*

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invalids resorting to them. The death rate in New Zealand has for many years been the lowest in the world. New Zealand is the home of the Maori, an interesting and picturesque native race. Moreover, it is a British Colony."

Lord Brassey, too, has borne testimony to the matchless beauty of our scenery. I quote from the 'British Australasian': "Asked at a recent interview whether he thought the scenery of New Zealand had been over-praised, Lord Brassey replied, 'I do not. I think no language could do justice to the subject. My experience in such matters has been greater than that which falls to the lot of most men. Voyaging along many coasts, I have seen much of Nature's beauty. I have made several voyages to the coast of Norway; I have been through Magellan Strait; I have seen the famous inland sea of Japan; I know Switzerland well, also Italy, and I have seen nothing which equals in beauty and magnificence the New Zealand Sounds. Whatever Nature has to show to man of the sublime and the beautiful is to be found there.'"

* At a meeting of the British Ornithologists' Club, held on April 25th, 1900, Dr. Hartert (on behalf of the Hon. Walter Rothschild) made an interesting exhibition of albinoes, melanisms, and other colour variations, from the Tring Museum, which contains probably the finest collection of such specimens in the world. In the course of his remarks,

Mr. T. W. Kirk has described a Ground Pipit *(Anthus novæ-zealandiæ)* which exhibited both melanoid and albinescent tendencies (see footnote on page xlii. of Introduction, vol. i.). In the 'Birds of New Zealand' I have recorded albinoes, more or less perfect, of thirty-three species (see enumeration, *l. c.*, p. xlii.), and in this 'Supplement' I have added eight more. I am informed by Mr. Walter Rothschild that he has received a pure albino of *Thinornis novæ-zealandiæ* from the Chatham Islands; also an entirely white *Œstrelata cooki* ♂, obtained off Stewart Island, and an example of *Himantopus melas*, in dirty-white plumage, with only a few black feathers on the upper surface.

It is, of course, the pigments in the feathers which produce the colours that we admire so much. Dr. J. S. Kingsley, in an excellent article on the subject, informs us that "a colouring matter which is called zoomelanin, and thought to be identical with coriosulphurine, seems to produce all the black and dark hues in birds, while some green colours are due to an admixture of yellowish pigment called psittacofulvine. A really green pigment has only been found in the Touracoes—hence the name turacoverdin,—and no blue or violet pigment has yet been discovered, while red (zooerythrine) is quite common. Another red, turacin, causes the magnificent red on the wings of the *Musophagidæ*. There is no white pigment, but wherever that colour occurs it is due to the countless number of interstices between the molecules of the feather, the substance of the latter being colourless. Many tints—for example, blue, violet, and certain greens—are not due to the pigment, which is black-brown to yellow, but the blue results from a particular surface-structure of the feathers, so that it must disappear if the colour-producing parts be destroyed. Thus, if we hammer carefully the deep-blue feathers of a Macaw, the blue colour immediately disappears, and the injured part looks grey or brownish, according to the underlying pigment. Some green parrot feathers, when treated in a similar way, become yellow, since this is the colour of their pigment." We are told that the gloss of feathers, independent of the colour itself, is the result of their surface being smooth and polished, while the metallic lustre is due to a transparent sheath which acts like a prism.

Closely connected with this subject is that of "dichromatism." Of this colour-problem the same author says: "We are accustomed to call it dichromatism, but of its true nature and its significance in the animal economy we are quite ignorant. By this term we designate the peculiarity, in certain species of birds, that individuals present two different styles of coloration, or 'phases,' presumably more or less independent of geographical distribution, present or past, or, in fact, of any apparent cause whatsoever. The difficulty in finding a plausible theory is much increased by the circumstance that there are nearly as many kinds of dichromatism as there are dichromatic species." Among the examples put forward by him is that of the dark and white forms of *Ossifraga gigantea*. In this I think he is mistaken. I have, from time to time, recorded seven examples of the white Nelly from New Zealand waters. Of these only two were absolutely pure albinoes. One of them, which I obtained at Waikanae, about forty miles up our Wellington west coast, and presented to the Colonial Museum, was of snowy whiteness, without blemish of any kind, even the legs and feet being whitish, whilst the bill was yellowish horn-colour. The other, which is almost as pure, was obtained at sea, about ten miles north of Milford Sound, and presented to me by the late Captain Fairchild. All the other examples are more or less marked with dark feathers, scattered irregularly over the entire body. There are

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Dr. Hartert called attention to the vital difference between true albinoes, which were born white, and in which the total absence of pigment extended also to the iris, which thus became pink, and "pied" or partially white plumaged birds, which had in many cases been at first clothed with a perfectly normal plumage, and in which the partial absence of pigment sometimes appeared after several moults, and was not always quite constant.

For a case of progressive reversion from partial albinism to the normal colour, see my account of *Cyanorhamphus auriceps* ('Birds of New Zealand', vol. i, p. 142).

certainly two phases of the dark plumage—the one uniform slaty-grey, the other paler grey with whitish cheeks and throat—but these differences are in my opinion attributable to age and sex.

In addition to "dichromatism" there is what is termed "trichromatism," where, apart from the normal form, there are two different colour-phases, although this phenomenon appears to want confirmation, the evidence in support of it being incomplete. If the theory be true, it may help to explain the formation of new species,—the original stock dying out in the struggle for existence, and the dichromatic phases becoming stereotyped into two invariable forms or species, separated geographically, but still identical in structure. Dr. Kingsley mentions an example brought forward by Mr. Ridgway, that of the Scarlet and the White Ibises (*Guara rubra* and *G. alba*), of which he remarks that they are now so different in colour that probably no one would deny their specific distinction, though structurally so alike that a specimen of the white one dyed scarlet would be indistinguishable from *G. rubra*; and he concludes with this observation: "The question which finally impresses itself upon the inquirer, in view of the above facts, is this: Are not the two or three phases of dichromatic or trichromatic species 'incipient species,' the final state of which will be that of the White and the Scarlet Ibises? The subject is one of the most perplexing, and consequently most interesting, questions in modern ornithology. It shows what we know, and particularly what we do not know; it shows that ornithology means more than a mere description and naming of birds; that one of its aims is to contribute to the solution of the great problem of the age—'the origin of species.'"

Of true xanthochroism—where the plumage is yellow instead of green—I have recorded several beautiful examples, notably a gorgeous yellow Kakapo and a canary-coloured Kea which will be found fully described in vol. ii. of this Supplement. The other instances are among the green Parrakeets—*Cyanorhamphus novæ-zealandiæ*, *C. auriceps*, and *C. erythrotis*—and the unique yellow Bell-bird in my son's collection. As Prof. Newton has pointed out, this may be a reversionary step, or a case of arrested development, because of the absence of the green-making superstructure.* Of cyanism, the only almost perfect instance I can recall is that of a striking example of *Cyanorhamphus novæ-zealandiæ*. The late Mr. G. R. Gray's so-called *Stringops greyi* is, without doubt, a case of partial cyanism or of a tendency in that direction. Of erythrism I have obtained very perfect representatives in *Nestor meridionalis* and *Cyanorhamphus novæ-zealandiæ*, the entire plumage being of a brilliant red.

Whatever the immediate cause of these departures from the normal plumage, the general result is the production of a very conspicuous and beautiful bird. These "freaks" have no intrinsic scientific value; but it will be seen how much they are sought after by collectors when I mention that the lovely yellow Parrakeet described by Mr. Kingsley† fetched £40, and is now in a museum in this country; that a black King Penguin, from Macquarie Island, was sold by a dealer for £75; and that the price finally placed by the owner on the yellow Kakapo mentioned above was £200!

* My son Percy, who is a keen entomologist, in the last letter I received from him (dated Wellington, 17th December, 1904) writes: "There is a remarkable illustration of xanthochroism among the large Green Moths (*Hepialus virescens*) in this country. I have made a great haul of these lately, capturing as many as thirteen absolutely perfect specimens in a single evening. One of these was of a uniform bright orange. A bright yellow 'Green Moth' is as great a rarity among *Lepidoptera* as a yellow Kakapo among birds, and the phenomenon is probably due to the same cause in both cases. At Papaitonga they emerge, about 9 o'clock in the evening, from the thick stems of *Aristotelia racemosa*, and are easily taken in a net as they wheel round a suspended lantern, emitting a bright light."

† Trans. N. Z. Inst., vol. xxiii., p. 192.

"THE OLD ORDER CHANGETH."

In the earlier part of this Introduction I dwelt upon the distinctive natural features of the native avifauna and directed attention to peculiarities in the local distribution of many of the species. But all this is now undergoing a rapid change. The Colonial "rage for acclimatisation," as it has been termed, is altering the face of everything. The ubiquitous House-sparrow now dominates the land; song-birds and game-birds from Europe abound everywhere; Indian Mynahs and Australian Magpies, and Rooks from the dear old country, in our plantations, with Black Swans and White Swans,* English Mallards and Wigeons on our lakes. Most of these birds, under the more favourable conditions of existence, are increasing prodigiously and imparting an entirely new feature to the New Zealand Ornis.

In my General Introduction (vol. i., p. xlvii.) I mentioned the circumstance of my having, in 1873, sent out to New Zealand a living pair of the Wood-owl (*Syrnium aluco*) with instructions to have them turned out in the Hawke's Bay district; that this was done accordingly, under Government protection, and that subsequently the birds fell victims to popular prejudice. This latter report appears to have been unfounded; because, shortly before I left the Colony in 1898, a period of twenty-five years having elapsed, a Wood-owl, in perfect plumage, was killed in the city of Wellington, some 200 miles further south. Late one evening in March, two gentlemen (the well-known city architect, Mr. Turnbull, being one of them) were walking down Wellington Terrace, when a large bird flitted past and one of them succeeded in knocking it down with his walking-stick. Mr. Turnbull had it skinned by a local taxidermist and shortly afterwards kindly presented it to me. This proved to be an adult Wood-owl, and it was evidently a wild bird, the feathers being perfectly clean and fresh. As no other importation of the kind had been recorded, this was without doubt a descendant from the pair introduced by me so long before. This specimen is now in my collection; and on comparing it with the large series of this species in the British Museum, I found that it had developed an unusually reddish plumage, there being only one other example in that collection, as far as I could see, at all resembling it.

Apart from the widespread introduction of foreign forms, we are, in the Colony itself, taking effective steps for obliterating the old boundary lines and changing the local habitat of many of the native species. As already stated, the Government has wisely set apart two island reserves—the Little Barrier at the North and Resolution Island in the South—and birds from all localities are being brought to these sanctuaries, where they will be secure from the depredations of stoats, weasels, and, perhaps worst of all, wild cats. Kakapos and Roas from the extreme south have been successfully removed to the Little Barrier, in the far north, where they have settled down and promise to do well in their new environment. It is to be hoped that Mr. Ballance's original idea of transporting thither some Huias from their home in the Tararua and Ruahine ranges will yet be given effect to, for this is the only possible chance of preserving a remnant of this beautiful Mountain Starling. It is well that we should record, before it is too late, all that we can learn about the local and geographical distribution of our native birds, because, in a few years, all will have become so changed by artificial agencies that the task will be impossible. Already the Hon. Walter Rothschild, in one of his essays on the genus Apteryx, has fallen into the error of assigning a North Island range to *Apteryx haasti* from information that examples of this bird existed on the small wooded island in Papaitonga Lake. These (as Mr. Rothschild afterwards

* Besides the English Mallard and other introduced waterfowl, the White Swan is now firmly established on the Papaitonga Lake. Five cygnets, a gift from the Royal flock at Kew Gardens, were turned out on the lake by the author, in 1893, and these have bred and multiplied, spreading themselves to the Horowhenua Lake, where—much to the popular indignation—an ignorant settler shot a pair of them, the result being that this 'Royal bird' is now protected by law.

discovered) were liberated there by myself, together with *Apteryx oweni* and *Apteryx mantelli*, my object being to bring together, on my own property, as many as possible of these endemic forms. As, in connection with these and other species, Papaitonga and its surroundings will have frequent mention in these volumes, I had better take the reader into my confidence at once and say something descriptive of the place.

Sixty miles from Wellington by the Manawatu Railway, and less than two miles to the westward of that line, there is one of the prettiest bits of scenery in New Zealand. This is Papaitonga, so called from time immemorial, the name signifying the "Beauty of the South." It is a fresh-water lake of 135 acres in extent, with two exquisite islands covered with bright vegetation. On the north and north-east sides it is enclosed by a beautiful native forest, which presents a thick fringe of tree-ferns and underwood along the water's edge; on the southern side there is open rising ground, with clearings in the forest beyond, showing the snow-covered ranges of the Tararua mountains; whilst on the low-lying flat to the westward there is an outlet to the sea, about three miles distant, by the tortuous Waiwiri stream. Every part of it is historic ground, Papaitonga having been the scene of one of the most important of ancient Maori fights, and the little island which has given its name to the lake the principal battleground. To this day the island is a perfect necropolis of human bones, although concealed and protected by the dense growth of evergreen vegetation that now covers the site of the ancient 'pa.' The original possessors of this picturesque lake, the Muaupoko, after being vanquished by Te Rauparaha and his armed followers, were driven out of the district, but a remnant was subsequently permitted to come back and settle at Horowhenua, a little further to the north, which is still the home of the tribe.

A full account (in English and Maori) of that memorable fight is given by the author in his 'Story of Papaitonga' (Trans. N. Z. Inst., vol. xxvi., p. 572-584).

The lake, under rigid protection, is a perfect sanctuary for native wild-fowl. Since His Excellency the Earl of Glasgow was a guest there, and enjoyed some good sport, in 1892, no shooting has been allowed on the lake, except for taking specimens, and, as a consequence, in the shooting season thousands of Wild-duck, Teal, and Wigeon congregate there, feeling perfectly secure from molestation of any kind. Dabchicks play on the placid surface of the lake, and Terns and Sea-gulls hover overhead; on the raupo-covered banks the Swamp-hen abounds, and down in the sedgy hollow may be heard, from time to time, the boom of the lonely Bittern. As the shades of evening close in, the shrill cry of the Wood-hen may now be heard on every side, although the bird is almost extinct in the surrounding country; and, later on, the solemn cry of the Morepork marks the approach of night.

The place is one of such surpassing beauty that, as far back as 1861, Sir George Grey, then Governor of New Zealand, endeavoured to purchase it from the native owners, intending, if possible, to make his permanent home there; but at that time the section of Ngatiraukawa, to whom it belonged, were under the influence of the "Maori King" and would not treat with the Governor's emissary. Subsequent Governors, and others, since that time have negotiated in vain till, in 1891, I was fortunate enough to become the purchaser of the property (now comprising, with additions, over 1,300 acres) which constitutes my country home in New Zealand.* It is a matter of local tradition that, in the olden time, a Maori from the north who had been visiting the tribe then residing on the shore, on taking his departure, stood for a while on a rising ground commanding a view of the lake, and then exclaimed: "Farewell Papaitonga!—

* Commenting on the incident, at the time, one of the local papers said: "On our asking the leading chief how it came to pass that, after so many years, they had now sold the place to Sir Walter Buller, his answer was 'Only because he is who he is,' thus bearing unconscious testimony to that gentleman's remarkable personality among the Maori people."

Alas! if your comeliness were but that of a woman, I would fain bear it away with me! Farewell, thou vision of beauty, a long farewell!"

The Hon. W. Pember Reeves (the present Agent-General for New Zealand) was a guest at Papaitonga shortly before coming to this country to take up his post, and one of the picturesque wooded bays was named in his honour. Cruising about this bay in a Rob-roy canoe, his poetic muse was inspired by his unique surroundings, and he composed the beautiful lyric, 'In Pember Bay,' which was afterwards published in his 'New Zealand and other poems,' and from which I quote the following five stanzas:—

Midway between the mountains and the deep,
Secure from upland cold, from salt winds keen,
Bathed in sweet air and sunshine, thou dost keep
A golden mean.

Dark clouds may brood on yonder peaks and spurs,
Chill winds may chase the sea-foam flake on flake;
But here is peace, nought ruffles, nothing stirs
The tranquil lake.

Nought shakes the ferns whose interlacing fronds
Like sea-birds' wings, uplift their giant pinions;
Nought stirs the brakes, whose creepers' myriad bonds
Guard green dominions.

Look, while the sunset clings to yonder range,
Look, while the lake gleams silver in its ray,
And pray that though all beauty else may change,
This scene may stay.

Here the wild birds, from ancient coverts pressed,
May seek asylum by this silent mere;
And though no other glade or wave give rest,
May find it here.

In the narrow parts of the lake, between the island and the shore, and in some of the deep bays, there were in former times renowned Duck drives, thousands of these birds being taken in a single season by the simple device of stretching right across the passage, and just above the surface of the water, a thin flax rope, supported by fixed stakes, with running loops or nooses suspended from it in close succession. A native boy in a canoe would gently drive the unsuspecting flock of Ducks before him in the gloom of the evening, when the snares had become invisible, and their fate was sealed. As a rule the species thus trapped was the Brown Duck (*Elasmonetta chlorotis*).

On the Papaitonga Island, which constitutes the Kiwi-preserve, there is the usual wild growth, in its rankest luxuriance. At one season of the year the lower vegetation is freely spangled with the white flowers of the native *Convolvulus*, 'pohuehue,' whilst from the higher bushes hangs, in graceful festoons, the beautiful star-like *Clematis*, or 'pikiarero.' At another season the place is radiant with the crimson blossoms of the 'tawhiwhi,' or climbing *Metrosideros*, and the air is laden with the fragrant flowers of the 'ti-whanake.' It is, in short, an ideal spot for the lover of nature.

It may be mentioned that on the island there is a famous obelisk, carved out of a great river canoe about seventy years ago, and called 'Ngarangiorehua.' It was originally erected at Pipiriki, in the Upper Wanganui, to mark the burial-place of a noted chief; then it stood for ten years or

IN PEMBER BAY, SHOWING STAKES FOR DUCK-DECOYS.

more in the Maori cemetery at Putiki, near the town of Wanganui; and was finally transported to Papaitonga, where it is erected to the memory of Te Ruinga, the ancestress of Major Kemp Te

THE KIWI PRESERVE IN PAPAITONGA LAKE.

Rangihiwinui, the late owner. These singular monuments are now becoming very scarce, and the history of the present one gives it a peculiar interest.*

On the southern shore of the lake stands the 'pataka,' or Maori storehouse, called Te Takinga, the elaborately carved porch of which was a special object of attraction in the New Zealand court at the Colonial and Indian Exhibition, 1886.

The wooded islet shewn below is of artificial construction, and was formed in ancient times to serve as a place of refuge. The manner in which this was accomplished is thus described by a Maori narrator in the 'Story of Papaitonga' (*l. c.*, p. 573):—

That other island yonder, the smaller one, was called Papawharangi. It is an artificial one, having been made by human hands in the following manner: First of all poles were driven in to define the extent of the

VIEW SHOWING PAPAWHARANGI ISLET.

proposed island. Then great lumps of 'negro-head' were brought from the shore and cast into the water within the line of the poles, and this was continued till a mound was formed level with the surface of the water. Then enormous quantities of *kakahi* shells from the refuse-heaps were brought over and cast upon the platform of 'negro-heads'; and after this many canoe-loads of soil were thrown on top. Then dry fern, and 'negro-head,' and all kinds of rubbish were spread over the surface, and lo! there was dry land in the midst of the waters. Upon the island so formed residential 'whares' were erected—four of them. But, owing to the encroachments of the water, the island has become diminished in extent; formerly it extended out to where you see the raupo now growing. However, if you take the trouble to look, you will find the boundary poles still fixed there, with any number of skulls also, and dead men's bones.

* Stone chisels and other evidences of ancient occupation are often dug up on the island, and on the camping grounds of the olden time just opposite to it. Not long since, a highly finished stone adze of phenomenal length, and with a sharp cutting-edge in spite of its undoubted antiquity, was unearthed in the vicinity of the lake, and this relic called by the Maoris "the sacred *toki* of Papaitonga," is now in the author's possession. There is a tradition, also, of a beautiful *mere-pounamu* (green-jade club) lying hidden under the pellucid waters of the lake, having been lost from a canoe in one of the ancient fights. But one of the most curious of the Papaitonga relics is a leaden bullet taken out of a log of hard totara, more than ten inches below the surface, when being cut up at the Ohau saw-mill, this ball having evidently penetrated a growing tree during one of the early fights a hundred years ago!

Through the bush-reserve on the eastern side of the estate the Ohau stream, from the Ruapehu range, runs over a shingly bed, its banks fringed with beautiful ferns and other evergreens, and its sparkling waters well stocked with trout. The reserve itself contains representatives of nearly all the New Zealand trees and shrubs; and there are still preserved in this romantic spot some noble specimens of the 'totara,' a tree now extremely rare all over the district.*

IN THE PAPAITONGA BUSH-RESERVE.

* In one of these bush-reserves there are to be seen numerous examples of a remarkable fungus, *Aseroe rubra*, thus described by Sir Joseph Hooker: "Two to four inches high; stem as thick as the thumb, even. Rays of the pileus about 8, bright red, long, subulate, 1 in.—2 in. long, split to the base, continuous with the stem, not divided from them by a deep groove."

I have met with this plant in other parts of New Zealand, always in the depth of the woods, its star-like form and bright colour attracting immediate notice. But an interesting fact discovered by me, at Papaitonga, was that this fungus appears to be insectivorous in its habits of life. I communicated an account of the discovery at the time to the Wellington Philosophical Society, and will reproduce here a passage from my paper ('Trans. N.Z. Inst.,' vol. xxv., pp. 302-304): "From the interior of the stem a viscid, foul-smelling fluid is secreted, and this rises into the cup and mixes

Rare plants and shrubs from other parts of New Zealand have been introduced and planted, with the intention of making it an epitome, as it were, of the indigenous flora. For example, here are brought together, and all in flourishing condition, the 'puriri' and the 'kauri,' from the far north, and the 'pohutukawa,' potted by himself and sent by Sir George Grey from his island-home at Kawau; the large-leaved and now nearly extinct *Meryta sinclairii* from the Hauraki Gulf and the beautiful *Olearia angustifolia* from Stewart Island; the graceful *Todea superba* from the Ruahine mountains and the edible horse-shoe fern *(Marattia salicina)* from the foot of Mount Egmont; the rare 'toi' *(Cordyline indivisa)* from the Murimotu plains and the 'ti-tawhiti' from the Wanganui river; *Hoheria populnea*, with its wealth of "orange blossom,"

OTOMURI: A NOTED KAKA RESORT IN FORMER TIMES.

from the south, and flowering Pittosporums of various species from all parts of the country. Here also are to be seen rare plants from the Auckland Islands, and from the Chatham Islands, such, for instance, as the so-called Antarctic Forget-me-not *(Myosotidium nobile)*—with its

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with the bodies of moths, flies, beetles, and other small insects collected there, which appear to undergo a process of gradual dissolution and absorption. Now, the question arises, Is this fungus, like the *Drosera*, a carnivorous plant, and is it endowed with its pungent odour, added to its flower-like brilliancy, for the purpose of attracting its insect-food? And is the fluid itself a solvent, with the acid constituent for aiding the process of digestion? My answer is in the affirmative. I dissected one of the stems, and found that it was hollow, or nearly so, with what appeared to be a membranous sac at the bottom containing fluid matter; but the examination, made on the spot, was necessarily a very hasty and imperfect one. As is generally known, we possess in New Zealand several species of *Drosera*, a group of plants which not only catch insects by means of their tentacles and the viscid matter secreted from their glands, but which, as Darwin has conclusively shown, have likewise the power of dissolving animal matter by the aid of this secretion, which contains an acid, together with a ferment almost identical in nature with pepsin, the matter thus digested being afterwards absorbed into the system of the plant as a means of nourishment."

huge glossy leaves and bright blue flowers—originally discovered by the author himself, on the seashore at Wharekauri, in 1855, and now extensively cultivated as a garden plant in the Colony and elsewhere; also a choice selection of shrubs from the west-coast sounds of the South Island.

Otomuri, on the eastern side of the Lake, was noted in former times as a Kaka resort. The land is now comparatively open on that side; but there still stands, on the bush-clearing at the back, an aged 'rata' tree from which hang remnants of the ancient vine-ladders by which the Kaka-snarers were accustomed to climb to their platform among the branches. A full account of this mode of snaring will be found in vol. ii. of this 'Supplement.'

PAPAITONGA LAKE, WITH MAORI GROUP.

In the fruit season the place is alive with Thrushes and Blackbirds and the air fairly throbs with their delicious song, whilst the English Skylark carols unceasingly overhead. But the song-birds levy a rather heavy toll for their services. In favourable seasons the trees in the orchard yield tons of sweet cherries, and it is marvellous in how short a time they are swept clean by these birds, very little fruit being left for the flights of native *Zosterops* which, having cleared the trees of blight during the winter, naturally come at the proper season to exact their tithes.

The group of Maori maidens in the view of Papaitonga given on the preceding page (from a life-size painting, by the talented Austrian artist, Lindauer, now in the author's possession)—with the Madonna-faced "lady of the lake" (a niece of the late owner) in the background bearing her paddle—presents a fair idea of the artificial surroundings of this delightful spot. The same war-canoe figures in the striking illustration which faces page 40 of Mr. Reeves' very popular work on New Zealand, 'The long white cloud, Aotearoa.' This particular canoe, called Te Ranga, is a very ancient one. It was brought from Wanganui and placed on the Horowhenua lake, many years ago, by the late Major Kemp, the acknowledged head of the Muaupoko tribe. With his full concurrence, it was purchased from the resident chiefs and removed to Papaitonga in 1892.

The photograph, of which the last-mentioned is a reproduction, was taken from the canvas by the artist himself; the rest, with scarcely an exception, are from my daughter's beautiful negatives.

GENERAL VIEW OF PAPAITONGA LAKE, FROM THE OLD MAORI WAR-PATH.

Class AVES.

Sub-class PALÆOGNATHÆ.

APTERYX LAWRYI.

(STEWART-ISLAND KIWI.)

Apteryx lawryi, Rothschild, Ibis, 1893, p. 575; Buller, Trans. N. Z. Inst., vol. xxix., p. 204 (1896).

I have thought it best to commence with the largest, the last discovered, and the least-known of this singular group of wingless birds; and I now propose to give its full history, so far as that is at present known to me.

The first example that I saw of this fine species, was the one exhibited at the Dunedin Exhibition in 1890—a very large female bird. I did not know at that time whence it had come, but I saw at a glance that it was distinguishable from the other known forms. Owing to its great size I naturally referred it* to *Apteryx maximus*, Verr., of which no description had been published. I purchased this bird immediately after its death, soon after the close of the Exhibition, and sent the skin—beautifully prepared by Mr. Sparkes, of the Canterbury Museum, N. Z.—to my friend, the Hon. Walter Rothschild, M.P., and it is now in his superb zoological museum at Tring.

Finding that this Kiwi had come from Stewart Island, I engaged Mr. O. Marklund, who was residing there, to collect a good series for me, which he accordingly did. These I shared with Mr. Rothschild, who described the bird as a distinct species in a paper communicated to the 'Ibis' for 1893 (p. 575), from which I extract the following:—

"*Apteryx maximus* is almost a fictitious species, though I am inclined to agree with Prof. Hutton that it was only an overgrown *A. haasti*. The name was published originally by Bonaparte in the 'Comtes Rendus,' xliii., p. 841, taken from an unpublished manuscript of Jules Verreaux, and then Prof. Hutton described a foot in his 'Catalogue of the Birds of New Zealand,' and ascribed it to this species. Both references, however, distinctly refer to a bird from the *South Island*. In 1891 Sir Walter Buller finally announced that he had discovered the true *A. maximus* on Stewart Island, and I am fortunate in possessing an entire series from his collection; but I most emphatically say that this species cannot be *A. maximus* of Verreaux, and therefore I have much pleasure in naming it *Apteryx lawryi*, after Sir W. Lawry Buller.

"Sir W. Buller fully described this bird before the Wellington Scientific Society. All that I shall add is, therefore, that, though the differences between it and *A. australis* are very slight, they are apparently constant, owing, no doubt, to the isolation of the species."

At a meeting of the British Ornithologists' Club, held on June 21st, 1893, Mr. Rothschild exhibited nine living specimens of the various species of Apteryx, together with nearly 100 skins (including a series of *A. lawryi*). This was in illustration of his "Notes on the Genus Apteryx," in anticipation of the complete monograph on the subject which he had then prepared and hoped soon to publish. This able and exhaustive memoir was not produced till 1899 ('Novitates

* *Trans. N. Z. Inst.*, vol. xxiii., pp. 602-603.

Zoologicæ,' vol. vi., pp. 361-402), and in it he gives his reasons for changing his mind and now considering this form as inseparable from *Apteryx australis*. In support of this view he publishes a table of comparative measurements, superior size being, admittedly, the chief criterion in this case. He abandons the conclusion which he had put forward with so much confidence when he exhibited his hundred and more specimens in 1893, and treats of the Stewart Island bird as the typical *A. australis*. He may be right; but, from the moment I first saw the Dunedin Exhibition example in 1890, I have never wavered in my conviction that this is a distinct species. Of course the whole value of the comparative measurements depends on the authenticity of the specimens. That all the examples of *Apteryx lawryi* I had sent on to Mr. Rothschild came from Stewart Island is unquestionable, because they were vouched for by Mr. Marklund, who never left the island and collected them there himself, forwarding with every specimen particulars of sex, locality and date. Can the same be said, with any degree of confidence, of the other examples with which Mr. Rothschild compared them, bringing him to the conclusion that *Apteryx lawryi* and *A. australis* are undistinguishable? Most of them, as I conclude, were obtained from Mr. Henry Travers.* Were these sufficiently authenticated? Mr. Travers is an excellent collector, and an energetic dealer, but in the latter capacity he has of course to trust very much to others. On one occasion I saw a large number of Apteryx-skins in his store-room, at Wellington, and was allowed to examine them. He expressed his belief that the birds had come from Stewart Island, but not a single skin had any label attached to it. Some of them were undoubtedly *Apteryx lawryi*, and the rest, so far as I could judge, as unmistakably *Apteryx australis*. This being the case, it is easy to see how errors might creep into the comparison Mr. Rothschild has instituted, for he could only go by the specimens before him. My own impression is that he had examples of both species, those of *Apteryx lawryi* having come from Stewart Island, and the rest from the mainland.

If Mr. Rothschild is right in his general conclusion, then it is clear to my mind that *Apteryx australis* cannot be distinguished as a species from *A. mantelli*—a view already advocated by Dr. Finsch (*Journ. für Orn.*, 1872, pp. 263-7); for the Stewart Island Kiwi, although generally of appreciably larger size, comes nearer to the last-named species than to the former. Its chief difference is in the absence of the stiff points to the feathers on the nape and hind-neck. Mr. Rothschild now pronounces *Apteryx lawryi* and *A. australis* one and the same species. Professor Newton has expressed his belief that *Apteryx lawryi* aud *A. mantelli* are one and the same, the difference in size being merely an incident of locality. If both these views have something to support them, then it would be safer to treat all three forms as sub-species derived from one common stock; and that, no doubt, is as near the truth as we shall get. The brownish-black Kiwi (*Apteryx bulleri*, Sharpe), regarded by Mr. Rothschild as identical with *A. mantelli*, would come into the same category as representing a fourth sub-species. For the purpose of this history, however, it will be more convenient to treat them all as distinct and separate species, whilst indicating their points of resemblance. This seems the more necessary since I have rejected the trinomial system, now so much in vogue. They may all grade into one another, from particular points of view, but that really does not matter. As I take it, the Brown Kiwis form one distinct group, and the Grey or Spotted Kiwis another, all having undoubtedly sprung from a common ancestor. We may, I think, regard the separation into species, sub-species, and varieties as artificial distinctions for the greater convenience of classification and description. This plan is consistent, too, with the now generally accepted doctrine that, in the great scheme of

* Mr. Rothschild, writing of this form (*l. c.*, p. 366), says: "Recently a good number have been captured on Stewart Island, and I saw, not long ago, a whole bundle of them put up for sale in an auction room in London." These skins, I am credibly informed, came from Mr. Henry Travers, and were all from the South Island.

the universe, the evolution of species, as we understand the term, is still proceeding. As to what constitutes a "species" is, after all, a mere matter of individual opinion. It is generally admitted that the distinguishing difference must be *constant*; but, as to the amount of difference necessary to entitle the form to recognition as a good species, zoologists are and ever will be more or less divided in opinion. Some go to one extreme and some to the other, and all recognise doubtful forms in between.* I have my own views, but am not ambitious to be classed either as a "lumper" or a "splitter." My one concern, as the biographer of the Birds of New Zealand, is to adopt such an arrangement of the forms as will enable the student readily to distinguish them and to learn all that is possible about their natural economy and life-history. This is all the more important, as many of the birds treated of in this work are fast vanishing from the face of the earth, to be seen no more, and to be remembered only by their preserved remains.

Of the Brown Kiwis, Mr. Rothschild, following the later style of nomenclature, recognises only *Apteryx australis australis*, and *A. australis mantelli*, and of the grey-spotted Kiwis also two forms, *Apteryx oweni oweni*, and *A. oweni occidentalis*, treating *Apteryx haasti* as quite distinct from the others. It seems to me, however, that the line of demarcation between them is a very uncertain one. Even Mr. Rothschild himself practically admits this; for a living bird, which I sent him some years ago, presents so many blended characters that he can only get over the difficulty by supposing it to be a wild hybrid! I am disposed, on the contrary, to treat these three last-named species as constituting a second closely related and very natural group.

In his valuable and very interesting monograph, Mr. Rothschild has paid me the compliment of reprinting, *in extenso*, the life history of *Apteryx mantelli*, as given in the 'Birds of New Zealand,' and likewise the whole of my notes on *Apteryx lawryi*, in the 'Transactions' of the New Zealand Institute, uniting the latter species (erroneously as I think), with *Apteryx australis*.

Mr. Rothschild's monograph contains some very interesting observations on the local geographical range of the various species, but the writer falls into the error of extending the range of *Apteryx haasti* to the North Island. He has since explained, however, through the columns of *Nature*, that this mistake arose from his having heard of the existence of the species on a wooded islet on the Papaitonga Lake, where these birds, together with *Apteryx mantelli* and *A. oweni*, had been placed by myself.

* In Ridgway's 'List of North American Birds' trinomial designations are adopted in no less than 160 cases. The author candidly acknowledges that the use of them has caused perhaps the greatest difficulty encountered in the compilation of the catalogue, "it being in many cases very difficult to decide whether a given form should be treated as having passed the varietal stage, and therefore to be designated by a binomial, or whether it is as yet incompletely differentiated and to be subordinated in rank by a trinomial appellation." His contention, however, is that every form whose characteristics bear unmistakably the impress of climatic or local influences, generally less marked towards the habitat of another form with which it thus intergrades, and all forms which certainly intergrade, no matter how widely distinct the opposite forms may appear, together with intergrading forms whose peculiarities are not explained by any known law of variation, should be reduced to subspecific rank. Commenting on this, the Editor of the 'Ibis' writes: "We cannot deny the advantages of the use of trinomials when strictly limited to such cases as these, and have little doubt that they will ultimately come into general use. But they can only be advantageously employed in countries such as North America and Europe, where large series can be obtained from different localities. In other parts of the world their use would at present be attended by much inconvenience, it being impossible to ascertain in very many cases, from lack of specimens, whether these intergradations exist or not. We may also remark that other authors use trinomials on quite different principles—*e.g.*, Dr. Sharpe, who in his 'Catalogue of Birds' (British Museum) has applied them in some instances even to insular forms (which certainly cannot intergrade) where the slight differences are, in his opinion, not strictly sufficient for specific distinction." I have been unable, however, to find that Dr. Bowdler Sharpe has in any way adopted trinomial nomenclature. He recognises "sub-species" but that, to my mind, is a very different thing.

Of this species the Colonial Museum, at the time of my departure from the Colony, contained a skeleton, but no skin. I fortunately possess a fine series which was collected for me, as I have already explained, prior to the issue of the Order in Council protecting the bird. Several skins and skeletons have reached Europe but, so far as I am aware, no living example. Knowing that the Zoological Society of London was most anxious to procure this species, I instructed my local agent to bring me a living pair, which he succeeded in doing. The Kiwi having in the meantime become a "protected bird," I applied to the Government for the necessary permission under the Act, explaining at the same time that I had procured the birds at my own expense as a gift to a Society of high scientific status, and one which had always been ready to do anything in its power to benefit New Zealand. I assumed, as a matter of course, that a permit would be granted; but, to my surprise and regret, the then Minister of Education considered it his duty to refuse my request, and I accordingly ordered the birds to be turned loose again. The Minister acted, as I was informed, on the advice of a permanent Under-Secretary possessed, apparently, of more zeal than intelligence. The inconsistency of the matter lies in the fact that a brisk trade in these birds was going on, at the time, under the very nose of the authorities, living specimens from Nelson being hawked about in Wellington,without any attempt to stop it.

My Stewart-Island collector, Mr. Marklund, who is a very observant man, has sent me many notes on this species: "At the end of July I came down from the hills; and on this trip I found that the Kiwis were moving down to the lower country—probably for nesting purposes. I should also mention—although it may be already known to you—that I have determined which of the cries are used by either sex. After some practice with a leaf of wild flax held in a certain position between my two thumbs, I can fairly well imitate their cry. I have discovered that the best time for these birds is a moonlight night, with the sky somewhat overcast. If it is too light, the birds will not leave the scrub. They also object to rainy weather. Though apparently insensible to pain when attacked by a dog, they are naturally very timid. If the moon is bright, their own shadow will sometimes cause them uneasiness; indeed, I have seen one make a kick at its own shadow on the ground, accompanied by that peculiar hissing sound they make when confined in a pen. I have noticed also that a smaller bird will always run as hard as his legs will carry him, at the least show of anger from a larger and stronger one. By imitating their cry—the deep rasping one being the more successful —I have always had the clear shrill one in response. If in the close neighbourhood, I would then send the dog in, and it would always turn out to be a male. The male is generally ready to answer, especially if it does not happen to know where its mate is, but the female is more independent, and often takes no notice whatever of the call. With this bird the ordinary relationship between the sexes appears to be reversed; for instance, it is the female that undertakes the defence of the house and home, for the male gives in after a very slight struggle; but the male is the faster runner of the two. After the young bird is big enough to follow its parents, the male (not the female) seems to take special charge of it. The male has a high shrill cry; the female utters a low hoarse note—between a cry and a hiss. In one case I heard the male uttering the cackling noise—like a hen with chicks—but that may be common to both sexes. Although a nocturnal bird, its sight is weak even at night, for I have seen them running against objects that could easily have been avoided; but their hearing and sense of smell are very acute. By going against the wind I have got to within 10 feet of them and seen them feeding. They do not confine themselves to worms, but will also take any kind of vegetable matter available—for example, the young shoots of a very common alpine orchid. I have found three different kinds of seed and a small white berry (of which I have not yet seen the plant) in the stomachs of those I have opened. Enclosed you will find some of the seeds on which

the Kiwis subsist. I do not understand how they can find any nourishment without cracking the seeds, but the fact remains that they do, for I have found these seeds in the stomachs of several that I have opened. The grass producing this seed grows in great abundance up to a level of 2,000 feet above the sea." The seeds sent proved to be those of *Gahnia procera*; they are red-coloured, and of the size of small wheat.

I reproduce here, on a small scale, a beautiful crayon-drawing made for me by Mr. Keulemans, representing a group of these birds, feeding, in the evening, on one of the flats in Stewart Island so well described by Mr. Marklund. The small distant figure, on the left of the sketch, shows their mode of probing in the earth for worms, and the principal figure, in the foreground, exhibits the Kiwi in its most characteristic attitude.

KIWIS ON THEIR FEEDING GROUND.

A pair which passed through my hands, in December, 1892, gave the following measurements:—

Male.—Extreme length, following curvature of the back 30·5 inches, to end of outstretched legs 36·5 in.; bill, along the ridge 5·5 in., along the edge of lower mandible 5·5 in.; from anterior margin of cere to extreme point of upper mandible, 4·5 in.; wing, 2 in.; tarsus, 3·5 in.; middle toe and claw, 3·5 in.; hallux, 1 in.; largest circumference of foot, 4 in. The rudimentary wings furnished at the extremity with a long, slightly-curved, greyish-black claw; that on the right wing 0·75 in. in length; that on the left wing 0·25 in. shorter and less curved. Weight exactly 6 lb.

Female.—Extreme length, following curvature of the back 33 in., to end of outstretched legs 43 in.; bill, along the ridge 7·75 in., along the edge of lower mandible 7·75 in.; wing, 2 in.; tarsus, 3·5 in.; middle toe and claw, 3·75 in.; hallux, 1 in.; greatest circumference of foot, 4·25 in. The claw or spur on the rudimentary wings 0·50 in. in length, more curved than that of the male bird, sharply pointed, and of a dark-grey colour. Bill greyish-brown, shading into

black on the culmen, especially in its apical portion, the tip being whitish horn-colour. Tarsi and toes dark bluish-grey; claws paler. Weighed 6½ lb.

The plumage of these individual birds is certainly very similar to that of *Apteryx australis*. The male presents more chestnut in the colouring, and the lanceolate markings on the upper surface are more distinct than in the other sex. This richer appearance is due to the feathers having chestnut tips, pointed with black. The bill and feet are likewise darker, and more uniform in colour, with lighter claws. In the male bird the tarsi, towards their distal extremities and the phalangeal joints, are scutellate, but in the female these parts are entirely covered by rounded scales. This goes to confirm the view already advanced by me that this character, to which so much importance has been given by some naturalists, has really no specific value.

Towards the end of 1890, I purchased from Mr. Bills, of Dunedin, two adult pairs which had been in captivity about six months. I had an enclosure made for them in a secluded part of my garden, at Wellington Terrace, and this they shared with the bird which afterwards became the type of Mr. Rothschild's *Apteryx occidentalis*. A small house was built in one corner of the enclosure, and well bedded with straw. To this place the birds always retired by day, huddling together to sleep like so many little pigs in a farm yard. I fed them habitually on bullock's heart, minced up small by the butcher, the daily allowance being half a heart for the five birds. They soon became accustomed to their new quarters and seemed quite at home there. About nine o'clock every night they screamed for a few seconds, alternately or in chorus, and then as a rule remained silent till near daybreak. About the first week in September, a change was apparent. The four birds paired and exhibited a considerable amount of excitement. Their cries at night became more vociferous, and in the evening, before leaving their retreat, or when retiring to it, as they did from time to time, they kept up a constant purring or low whimpering sound. The males, hitherto so docile, became savage and aggressive, rushing at any one who dared to enter their enclosure, kicking vigorously and growling in evident displeasure. I watched them carefully till the 16th October, on which day I introduced a cask with an aperture at the end and well stuffed with straw, in the hope that they would adopt it for nesting in. I noticed that one of the males immediately explored it, burying himself in the straw, and apparently determining the fitness of the cask as a breeding place. Towards the end of October, the female birds appeared to get impatient of restraint and made persistent attacks on the wire netting covering their enclosed place; so much so, indeed, that one of them had the base of the bill stripped and injured. To put an end to this, I enclosed a portion of the garden adjoining their yard and gave them access to this at night. This seemed to satisfy them and they settled down quietly to the new condition of things. On the 17th January, I turned into the small enclosure two young Oyster-catchers *(Hœmatopus unicolor)*. Hearing the young birds piping vigorously in the evening, I went down and found that the Kiwis had killed one of them outright, and were worrying the other. The defunct Oyster-catcher had its right wing completely broken and its body much bruised, evidently from a downward blow of the Kiwi's powerful foot. When I entered the yard I found the Kiwis in a highly excited state and running at one another with a loud grunting note. They immediately attacked my legs and manifested generally a very unquiet spirit.

Having about this time to leave Wellington for several months, I was compelled reluctantly to ship the birds to England, and thus my observations on their habits were brought to an end, without any definite result.

The accomplished editor of the 'Ibis' (Dr. P. L. Sclater) recognised the distinctness of *A. lawryi* at first sight, for he says (*op. cit.* 1893, p. 128):—"Four specimens were brought to Wellington alive, and then shipped to Europe. These are, no doubt, the birds belonging to Mr. Walter Rothschild, which were placed under the care of Mr. Doggett, of Cambridge, where

we had the opportunity of examining them in August, 1891. They are, we believe, the only specimens of this fine species ever seen in Europe."

On the 21st February, I killed a pair of *Apteryx lawryi* received from Stewart Island. Although the birds had been in captivity for six weeks, and had lost all their fat, the male weighed 5½ lb. and the female 7½ lb.

The following measurements were taken from the specimens before being skinned:—

Male.—Extreme length, to end of tail 26 in., to end of outstretched legs 36 in.; rudimentary wing, 1 in.; terminal claw, following curvature, 0·25 in.; bill, along the ridge 4·56 in., along the edge of lower mandible 5·25 in.; tarsus, 3 in.; middle toe and claw, 3·5 in.; hallux, 0·6 in.; circumference of tarsus, in the middle 2·25 in., at the junction of the toes 4·2 in.

Female.—Extreme length, to end of tail 30 in., to end of outstretched legs 39·5 in.; rudimentary wing, 1·5 in.; terminal claw, following curvature, 0·5 in.; bill, along the ridge 6·75 in., along the edge of lower mandible 7·25 in.; tarsus, 3 in.; middle toe and claw, 3·5 in.; hallux, 0·75 in.; circumference of tarsus, in the middle 2·4 in., at the junction of the toes 4·25 in.

Externally the sexes are alike, except as to size. Both specimens exhibited in the bill a slaty-black upper surface, but in younger examples I have noticed that it is horn-coloured. The thighs are of great size and strength, testifying to the bird's power of rapid locomotion. In the female, which is appreciably the larger bird, the thighs would weigh each, I suppose, not less than a pound.

I sent to Professor Hutton, for the Canterbury Museum, a very fine skeleton of *Apteryx lawryi*. The bones of the bill (the sheath having been removed) measured:—along edge of upper mandible, 7·30 in.; the same from gape, 8·75 in.; along edge of lower mandible, 8·25 in.

I obtained some further particulars from Mr. Marklund, by whom these two large Kiwis (and about a dozen others) were collected. He says that the bird is very scarce, and has to be hunted for over a large extent of country. Its favourite feeding-ground is the summit of Table Hill, rising to an elevation of 2,300 ft., which is covered with grass and stunted vegetation, and in the daytime it has to descend some 500 ft. in order to camp in the bush, the summit not affording sufficient covert. He has never found any on the western slope of Table Hill below a level of 1,000 ft.; but on the eastern side the Kiwis go right down to the plain, or practically to the level of the sea. He has found them inhabiting holes among the roots of the "mutton-bird woods."

He generally found a pair of birds together in one hole, sometimes accompanied by a single young one. On one occasion he found five birds inhabiting an extensive chamber. Being without provisions, he had to cook and eat them, rare as he knew the bird to be. From the retreat of this party of five to the summit of Manuka Flat (a distance of half a mile) there was a broad beaten track, as if sheep had been accustomed to travel over it. The roots crossing this track were so worn and abraded that he came to the conclusion the Kiwis had been using the path continuously for several years. He says that this species has three distinct calls: one is a loud shrill whistle, especially in fine evenings when the atmosphere is clear; the second is a deep rasping note, seldom heard; and the third is a low clucking sound, rarely uttered. In hunting these birds his plan was to start about three a.m., before daybreak, while the scent was strong upon the ground, and then to intercept them on their way from their open feeding-grounds to the shelter of the mutton-bird woods, or track them by means of the dog to their holes. The old birds often make a stubborn resistance, and the first time that his dog tackled one of them, he got his foreleg ripped up for about six inches by the bird's claws.

Mr. Marklund, in another of his letters to me, says:—"I have just returned from a trip down to Pegasus, and got some very large specimens of Kiwi, which I am sending you. We had five days' provisions with us, and during that time I was both on the eastern and western sides of Mount Pegasus. On the eastern side the Kiwis are getting very scarce, owing, I think, to

the number of wild cats there. When the Pegasus mine was abandoned, about five years ago, the diggers left from fifteen to twenty cats behind them. Now they have spread all over the eastern side, and northward as well. On one tract of country especially (called Robertson's country) Kiwis were very plentiful at that time: now it is almost impossible to find one, although we worked all over the flats at night. Down south of Port Pegasus there is a large tract of bush which has never yet been visited. It would be very interesting to spend three months there, One of the Kiwis I brought in reached 9¼ lbs. when put on the scales, and another has a bill 8 inches long, measuring from the corner of the mouth to the point of the upper beak. One of the birds I am sending you has plumage differing from that of any I have yet seen. It was also the heaviest, although a male." (This proved to be the variety distinguished by the Maoris as Kiwi-kura.) Marklund adds: "I have found vegetable matter in one of the Kiwi's stomachs. I thought I could distinguish the remains of white berries, but I will verify this later on."

Apteryx lawryi is very rare in collections, both in Europe and in the Colony. Being now rigidly protected, it is of course difficult to obtain specimens. There is a chance of this bird being preserved in Stewart Island, which has happily escaped the introduction of stoats and weasels; but on the mainland the protection comes too late, both for the Kiwi and the Kakapo.

In the same hole with a very large example forwarded to me, there was a nestling, apparently only a few days old, from which I have been enabled to furnish a description of the species in that stage.

Young.—Head, throat, and under-parts generally greyish-brown, the disunited filaments of the feathers imparting a hairy-like appearance to the plumage; on the hind-neck these filaments assume a more arrow-head appearance, the plumage being at the same time very fluffy; upper surface generally tawny-brown, with yellowish-brown shaft-lines, the latter being a distinctive feature; bill and feet pale-brown.

Half-grown bird (probably a year or eighteen months old).—Plumage similar to that of adult, but with more chestnut-colour in it; feathers covering flanks with shining amber-coloured shafts; bill, 3 in.

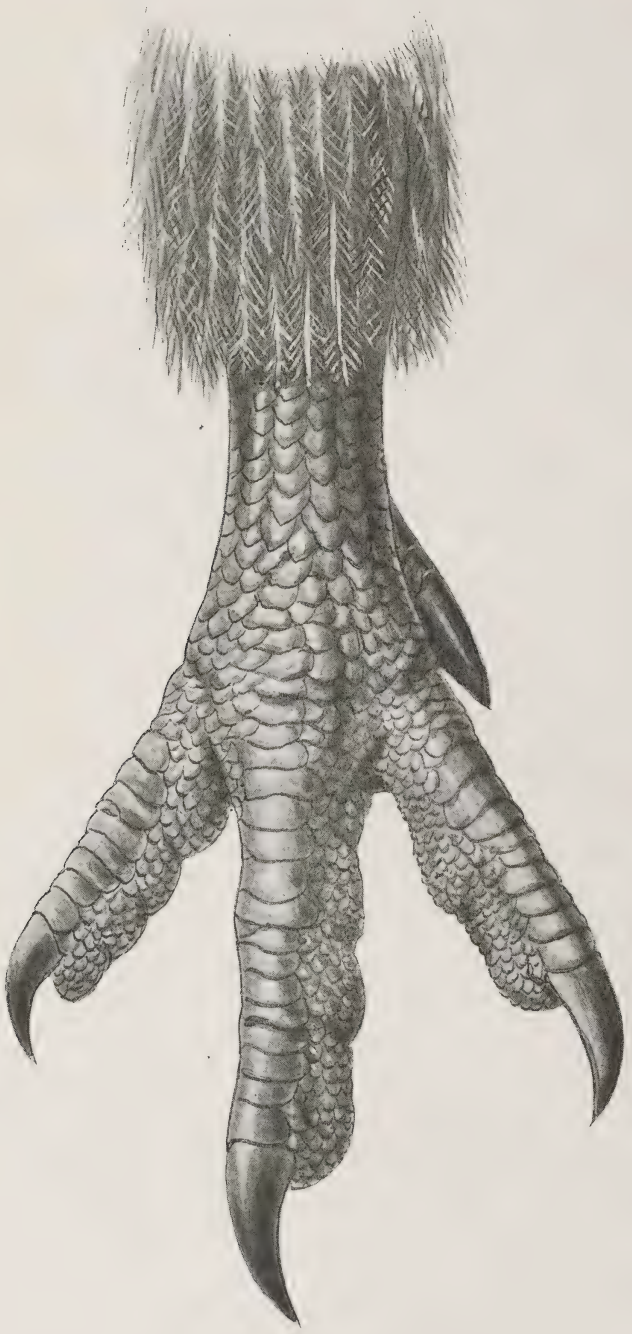
The adult, as already stated, resembles very nearly in its plumage *Apteryx mantelli* of the North Island; but the young is very different to that of the latter species, being far more like that of *Apteryx australis.*

Towards the end of November Mr. Marklund obtained two eggs of this species of Kiwi, after nearly a month's continuous search; but it was so late in the season that, in both cases, the chick was fully formed within the shell, and had to be removed by incision. This somewhat damaged the specimens, but I am nevertheless able to give a full description of them. They differ conspicuously both in size and in contour. The larger one measures 5·4 inches in length by 3·25 in. in breadth, and is perfectly elliptical in shape, there not being the least indication of a smaller end. The other egg is smaller, measuring 5·1 in. by 3·1 in., and is narrower at one end. Both of them are of a very pale green colour, or perhaps, more properly speaking, greenish-white. and the shell, especially in the smaller egg, exhibits minute, widely-scattered pits on the surface, distinctly visible under a magnifying glass, and similar to the markings on the egg-shell of the Moa. In forwarding the specimens, my collector says: "I had a very hard job in procuring these eggs, as the birds do not go far away from their nests while hatching, and of course the dog got a very poor chance of picking up the scent. One of the eggs was somewhat damaged through the bird defending it from the dog, before I could reach the place; nevertheless it has a good 'show'-side. The larger of the two I procured in a locality where I had never been before, and, owing to the dog being muzzled, the bird that was sitting on the egg managed to escape; and, inclement weather coming on, it was impossible to get another specimen before I had

to leave. In the breeding season the birds never come out on the open ground—in fact, they seem to be starving themselves in their fear of leaving the nest or its close vicinity." In another letter he says: "In one of the females opened by me (in July) I found an egg without any shell. It would have been ready for extrusion in about a month or so."

Another good reason, therefore, for keeping this species distinct, is the striking difference in its egg from that of *Apteryx australis*. One which I brought with me to England is a perfect ellipse in shape, and of a pale-green colour. It measures 5·25 in. in length by 3·25 in. in width. A celebrated egg-collector, the late Philip Crowley, to whom I submitted it, wrote saying: "The pale-green colour of the shell is very curious; I have always found the shell white in the other species." This example is now in the British Museum.

Two eggs which I sent to Mr. Rothschild (now in the Tring Museum) are similar, but of a paler green.



FOOT OF APTERYX LAWRYI, ♀, NATURAL SIZE.

The accompanying drawings of the head and foot of *Apteryx lawryi*, from the pencil of Mr. Keulemans, will give a better idea of the relative proportions of this species, as compared with the others, than would a much reduced illustration of the bird on a coloured Plate.

HEAD OF APTERYX LAWRYI, ♀, NATURAL SIZE.
(*From a specimen in the Author's collection.*)

APTERYX AUSTRALIS.

(SOUTH-ISLAND KIWI.)

Apteryx australis, Shaw, **Buller, Birds of New Zealand, vol. ii., p. 322.**

BEFORE leaving New Zealand, I received a live example of this species from Milford Sound, in the South Island, and kept it for a time in my enclosure. At a glance, its distinctness from *Apteryx lawryi* was apparent. Its white-horn-coloured bill and its fleshy-white feet, the streaky character of the plumage, caused by the light-brown stripe down the centre of each feather, irrespective of its smaller size, make it readily distinguishable from the last-named species. On placing the bird in the Kiwi-yard it was at home at once, retiring into the empty cask provided for it. In disposition this bird differs entirely from my other captive Kiwis—*Apteryx lawryi*, *Apteryx haasti*, and *Apteryx oweni*—being far more fierce and aggressive. On approaching the cask, soon after it had taken up its quarters there, the bird came out and gave battle at once, even in the daylight, grunting angrily and striking forward with his feet, which are armed with very sharp claws.

This bird, although in excellent condition, died suddenly without any apparent cause. Possibly it accidentally got at some poison which had been deposited in a rat-hole. It gave the following measurements: Extreme length, to end of tail, 28 in.; to end of outstretched legs, 34·5 in.; culmen (measuring from anterior edge of fleshy cere), 5·25 in.; along edge of lower mandible, 6 in.; tarsus, 3 in.; middle toe and claw, 3·5 in.; hallux, 0·75 in.; largest circumference of foot, 3·75 in.; rudimentary wing, from flexure to end of spur, 1·4 in. The spur on each wing was a mere claw 0·25 in. in length, and white, with a greyish point. As already mentioned, the feet are white, but there are small brown scales on the heel and hind part of tarsus. The tarsus presents a regular line of angular scutella in front, and the claws are perfectly white. In all these points this species differs from *Apteryx lawryi*. In addition to the features already recorded, which distinguish this bird from *Apteryx mantelli*, there is another which is worth mentioning: the feathers of the under-parts have the peculiar silvery or shining shafts characteristic of the Moa-feathers which Mr. Taylor White collected many years ago, at Queenstown, and exhibited at the Colonial and Indian Exhibition, 1886.

From the body of one captured in Dusky Sound, Sir James Hector took a tick-parasite, which was characterised as a new species by Mr. Maskell under the name of *Ixodes aptericola.**

Mr. Henry, the caretaker of Resolution Island, writes: "We had put several pairs of these birds on Parrot Island, which is only a couple of hundred acres in extent, and on the 15th November I went to see how they were getting on, and found one hatching a fresh egg. In the same hole with him was a chicken only a week or two old. This was a plain case of breeding twice."

Sir Richard Owen, in his treatise on the anatomy of Apteryx, says: "On a review of the details of the muscular system above recorded, it will be seen that the analogies of the muscles on the dorsal aspect of the spine with those of Man and the Mammalia are, in consequence of their unusually strong and distinct development in the Apteryx, more closely traceable than their condition in other birds perhaps admits of."

* *Trans. N.Z. Inst.*, vol. xxix., p. 292.

APTERYX MANTELLI.

(MANTELL'S KIWI.)

Apteryx mantelli, Bartlett, **Buller, Birds of New Zealand, 1st Ed. 1873, p. 358.**
Apteryx bulleri, Sharpe, **Buller,** *op. cit.*, **2nd Ed., 1888, vol. ii., p. 308 [in part].**

I have little or nothing to add to the full account of this Kiwi recorded in the 'Birds of New Zealand' (vol. ii., pp. 311-321).

As already mentioned, I liberated this species on the wooded island in Lake Papaitonga, the first suggestion having come from my friend Tamati Ranapiri, in a letter, of which the following is a translation :—

"Manakau, *5th February*, 1897.

"Friend, Sir Walter Buller, Salutations! I have in my possession a live Kiwi, one I brought with me lately from Whakarewarewa, Rotorua. I have thought that it would be an excellent thing to place it on your island at Papaitonga. If you desire to have it, then come at any time, and fetch it from my place here at Ohau.

"From your friend,
"TAMATI RANAPIRI."

It is very pleasing to find a Maori taking so practical an interest in the preservation of one of the vanishing forms of native bird life. But the writer of the letter is an exceptionally intelligent man, belonging to the Ngatiraukawa tribe. He is the owner of a small sheep-run and model farm at Ohau, from which he derives a considerable income, and he takes an active part in the affairs of his race. He is the author of a most interesting article (in Maori) "On the Native Modes of Catching Birds," in the 'Polynesian Journal,' illustrated with very creditable drawings by himself!

I have to notice a singular development in the bill of a Kiwi from the Hawera district, which was kindly presented to me by the late Mr. S. H. Drew, of Wanganui. The lower mandible was bent downwards at the tip, after the familiar form of a boathook. Most of the toes were without claws, having blunt and rounded extremities. I think this condition was due to the bird having, when very young, passed over ground on which a fire was smouldering, using the bill in the manner habitual to it, and getting severely burned in consequence. Notwithstanding these drawbacks, this Kiwi seemed to have had no difficulty in procuring food, and was in excellent condition of body when presented to me. As requested by Mr. Drew, I turned it loose on my little wooded island, at Papaitonga, where it would have the companionship of its own and other species.

I find in my diary a note which is worth recording, as showing the wonderful vitality of this species. I purchased a half-grown Kiwi, in vigorous health, which I decided to kill as a specimen. I adopted the usual means—compression of the breast-bone against the back. The Kiwi fought hard for life, but at length succumbed, and I laid it in a specimen-box, limp and lifeless, being to all appearance absolutely dead. In the evening I went to fetch my bird, intending to skin it, when, to my surprise, I found it alive and active, showing no sign of the tragic experience of the morning. I had not the heart to repeat the experiment, so I had a comfortable cage made for it, kept the bird for a month to accustom it to confinement, and then shipped it to England as a present to the Zoological Society, rewarding in this manner its heroic struggle for existence.

This was in 1898; and I am glad to be able to report that the bird is still living in the Society's Gardens, and appears to be in excellent health.

This form is still comparatively abundant on the western side of the North Island. Mr. Leith Fraser and his survey party lived almost entirely on Kiwis for several months while cutting the bush lines. One day they found a female bird in a hole under a big rata with three lovely little yellow-coloured chicks. He described them as being of the colour of ripe maize. I never heard before of a clutch of more than two. He states that on one occasion, when they had been without food for two days, excepting a little tea without sugar, a large fat Kiwi with a broken leg came into the tent, and this bird supplied their party of four with food for two days.

Captain G. Mair says they are still comparatively plentiful in the Wharekawa Ranges, near the Thames.

A brown chick of this species, which I purchased from Mr. Spencer, of Auckland, came from Hokianga.

The natives say that a Kiwi-hunting party at Taupo, in the winter of 1895, brought in no less than eighty birds, including two pure albinoes.

Mr. A. Sutherland, in his paper "On the Temperature of the Ratite Birds,"* says:—

> I received from Mr. Sclater and Mr. Bartlett courteous permission and a generous co-operation in taking the temperatures of the three specimens [of Apteryx] now in the Gardens, and I wish to place on record in the *Proceedings* of the Society that the Apteryx is the lowest in temperature of all birds so far as yet has been recorded.
>
> The following were the rectal readings:—
>
> | | |
> |---|---|
> | Mantell's Apteryx, male ... ... | 37·4°. |
> | „ „ young male ... | 38·2°. |
> | Haast's Apteryx, male ... ... | 38·1°. |
>
> The average is 37·9° C. (100·2° F.)

He speaks of Apteryx as being "structurally the lowest of birds."

Mr. Pycroft writes from the Bay of Islands (Trans. N.Z. Institute, vol. xxxi., p. 145):—"It is common in places, especially at Whangape and between Opua and Waimate. It is a frequent occurrence for pig-dogs to secure one, and sometimes more, Kiwis during the day. Unfortunately, birds caught by pig-dogs are generally torn and useless. The country for eight miles behind Opua is very broken and wild, with heavy bush in the gullies, and there Kiwis will be plentiful for some time, if not troubled by stoats and weasels. I have a perfect egg, which I felt in a Kiwi obtained from a native. Thinking the egg would be broken if laid, I chloroformed the bird and cut the egg out. It is perfect, and I have it yet. I have received eggs from July until February, but the eggs I got in February contained fully developed and feathered chicks."

Captain Mair, in a letter dated July 17th, 1902, says: "Last month I was on the wooded ranges near Miranda pigeon-shooting. I slept out one night and heard lots of Kiwi. Next morning my young setter brought me a huge dead hen-bird. I never saw such fatness before. I am told that they are really increasing in that district, which is a matter of wonderment, seeing that the stoats and weasels are rapidly destroying all our other birds, pheasants included."

I have already given a full account of the Maori mode of catching the Kiwi. Mr. Elsdon Best, in his 'Sketches from Tuhoeland,' adds the following:—"The Kiwi were also hunted with dogs by the food-seeking Maori, though the term *whakangau* (to hunt with dogs) is only applied

* *Proc. Zool. Soc.*, 1899, p. 787.

to pig-hunting here. To hunt kiwi is *whakangangahu*, and the call is known as *whakahini;* it is made by whistling with a bent finger in the mouth (*korowhiti*). The Kiwis reply to the hunter's whistle; hence he is enabled to locate them. Kiwi are still numerous around Tara-pounamu and the headwaters of the Okahu."

The late Professor T. Jeffrey Parker, F.R.S., sent me the following interesting notes on Apteryx, which have already appeared in the 'Transactions' of the New Zealand Institute, vol. xxix., p. 184, but are worth reproducing:—

I have read your article, 'Illustrations of Darwinism,' with some care, and highly approve of most of it. There are a few criticisms I should like to make.

The upper mandible (of *Apteryx*) is a prolongation of precisely the same bone as in other birds—premaxillæ, nasals, &c. The 'cranial pan' is rather exceptionally large in *Apteryx*. I have often wondered what it wants with such a big brain.

You are quite right about the extreme specialisation of *Apteryx*. See my paper on its development: *Philosophical Transactions*, 1891, summary, p. 116. See also the brief account of the matter in the *New Zealand Journal of Science*.

Megalapteryx is not a 'Giant Kiwi,' but a Moa, as Lydekker first showed.

My observations on the skull of the Dinornithidæ (see Proc. Zool. Soc., Feb. 14th, 1893) distinctly contradict your view that the larger forms of Moa are the most ancient. The oldest (least specialised, &c.) type of skull is *Mesopteryx* (including *Casuarinus*, *Didinus*, &c.), while the very tall forms (*robustus*, *giganteus*, &c.) and the thick-legged forms (*elephantopus* and *crassus*) are highly specialised in different directions.

Your observations on the numerous species of *Apteryx* and their distribution are very interesting. What strikes me at once is, what a pity that the skeletons are not properly described! If you ever have the chance of getting any, I wish you would lend them to me for that purpose. I think I may say without undue vanity that I could monograph the skeletons of *Apteryges* as well as most men. Unfortunately, it is of little use to begin until one has a good series of well-authenticated specimens of all the species, and I am sorry to say I cannot give the collectors *carte blanche*.

I am glad to add that I was able to procure for Professor Parker a specimen in the flesh and two rough skeletons of the giant Kiwi (*Apteryx lawryi*) from Stewart Island. He had devoted special attention to the anatomy of Apteryx and his remarks, quoted above, are therefore valuable.

In the paper to which Professor Parker refers, I gave reasons for my conclusions that the larger forms are the more ancient, being those that roamed originally over the afterwards submerged continent, and that the smaller-sized Moas, of different genera and species, are the descendants of those which had been specialised in the various islands during the long epoch following the continental submergence. As will be seen, Professor Parker differs with me on this point. I mentioned, in that paper, Captain Hutton's published view that the smaller forms of Ratitæ in New Zealand must have preceded the larger, but I also quoted from his paper "On the Moas of New Zealand" (Trans. N.Z. Inst., vol. xxiv., p. 149) a passage which seemed to show that a difficulty about this existed in his own mind. It was this: "Evidently *Anomalopteryx* and *Palapteryx* are the oldest forms; but if *Palapteryx* had wings it could not have been derived from the wingless *Anomalopteryx*, and, if the birds were increasing in size, *Anomalopteryx* could not have been derived from *Palapteryx*." I added, by way of commentary: "Exactly so; but on my hypothesis these difficulties disappear, and the supposed conditions are in harmony with it." It would seem that Captain Hutton—who has studied the subject very closely, and whose opinion is entitled to great respect—has arrived at the same conclusion as myself, for in a very interesting article subsequently communicated by him to the Canterbury 'Press,'* he says: "The commoner

* 'The Rise and Fall of the Moa,' by Captain Hutton, F.R.S.—The *Press*, November 2nd, 1896.

kinds of Moas were comparatively small birds, from 3 ft. to 5 ft. high, and it seems probable that the giants of the race, which attained a height of about 12 ft., had all died out before the advent of man. At any rate, there is no record of any bones of *Dinornis maximus* or of *Dinornis giganteus* having been found among the remains of Maori feasts."*

Mr. A. D. Bartlett, the former Superintendent of the Zoological Gardens, who was the first to differentiate this species, gives the following account of the breeding of a pair in his charge :—

> They showed a desire to pair by the loud calling of the male, which was answered by the femlae in a much lower and shorter note. They were particularly noisy at night, but were quite silent in the daytime. The female laid two or three eggs, but as soon as she quitted the nest the male bird took to it, and remained constantly sitting. By-and-by, the birds occupied the two opposite corners of the room in which they were kept, the male being on the two eggs in the nest under the straw, while the female was concealed in her corner, also under a bundle of straw placed against the wall.
>
> During the time of incubation they ceased to call at night; they were perfectly silent, and remained apart. The eggs were found in a hollow formed on the ground in the earth and straw, and placed lengthwise side by side. The male bird lay across them, his narrow body appearing not sufficiently broad to cover them in any other way. The ends of the eggs could be seen projecting from the side of the bird. He continued to sit in the most persevering manner until he was exhausted, and he then left the nest. On examining the eggs, no traces of young birds could be found, but Mr. Bartlett says that, notwithstanding this failure, there was sufficient to show that the Kiwi's mode of reproduction does not differ essentially from that of the allied Struthious birds, as in all cases that have come under his notice only the male bird sits. 'I have witnessed the breeding of the mooruk, the cassowary, the emu and the rhea,' he says, 'and the mode of proceeding of the Apteryx fully justifies me in believing the habits of this bird to be in no way materially different from those of its allies.'

From the body of a specimen I had received alive, from the wooded ranges inland of Mount Egmont, I took several examples of a tick-parasite, which I at once handed over to Mr. W. M.

* The late Professor T. J. Parker, in his valuable 'History of the Kiwi,' indicates generally that the ancestors of *Apteryx* had the interrupted pterylosis, or feather-arrangement, characteristic of the Carinatæ, and that once upon a time their remarkable fore-limbs were true wings, which have been lost, probably for want of usage. A minor matter which, to his mind, points to the same conclusion, is the fact that a sleeping Kiwi assumes precisely the same attitude as an ordinary carinate bird, the head being thrust under the side feathers, between the body and the upwardly directed elbow. "On the whole," he says, "it will be seen that the study of the development of the Kiwi tends to lessen the gulf between it and ordinary birds, and to show that its ancestors probably possessed many of the more important and distinctive features which characterise the Carinatæ of to-day. The facts clearly indicate that the founder of the Apterygian house had interrupted plumage, functional wings, an ordinary avian tail, a keeled sternum, a double-headed quadrate, lateral optic lobes, and a pecten in the eye; in other words, that the ancestors of the genus were typical flying birds, and not bird-like reptiles." As to the relation of the Kiwi to the other genera, Professor Parker finds that it has been shown to be most nearly allied, as far as its skeleton is concerned, to the Moa, differing from it, however, in many important respects. He says that it must certainly have been isolated at a very distant period, and, as far as can be ascertained, some of its more striking peculiarities are distinctly co-related to its method of feeding. "Most nocturnal animals have large eyes, suited for taking the utmost advantage of the semi-darkness," he concludes, "but the Kiwi, finding its prey by scent alone, has developed an extraordinarily perfect olfactory sense, while at the same time, having no need to keep watch against beasts of prey, its eyes have diminished in size and efficiency to a degree elsewhere unknown in the bird class."

Professor Newton says, in his 'Dictionary of Birds' (p. 497) :—"Did space allow, much more should be said of the Kiwi—perhaps to ornithologists the most interesting group of birds now existing, and the most interesting in regard to the melancholy doom of extinction which almost inevitably awaits them; but there is some consolation in the thought that their anatomy and development have been admirably studied and described in the light of existing scientific methods by Professor T. Jeffrey Parker (*Phil. Trans.*, 1891, pp. 25-134, plates 3-19; 1892, pp. 73-84, plates 7, 8).

Maskell. It proved to be a new species, and he described and figured it under the name of *Ixodes apteridis.*[*]

The Maoris value the Kiwi chiefly on account of the feathers, from which they make beautiful robes. A mantle is first hand-woven out of soft, dressed flax, and on this the feathers are laid, one by one, the concave surface outwards and the root doubled back upon the shaft and secured firmly to the underlying woof. These Kiwi robes are much valued by the chiefs, and as much as £40 has been paid for an exceptionally rich one, whilst they readily bring half that price on the market. The one shown in the illustration reproduced from an Auckland photograph (artist unknown) is varied by having a central bar and an outside edging of white feathers taken from albino Kiwis.

MAORI GIRL IN KIWI ROBE.

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[*] *Trans. N. Z. Inst.*, xxix., p. 291.

APTERYX BULLERI.

(BULLER'S KIWI.)

Apteryx bulleri, Sharpe, Trans. N. Z. Inst., vol. xxi., p. 224.

There can be no doubt that there are two forms of *Apteryx* inhabiting the North Island—one chestnut-brown in colour, the other blackish-brown—as easily distinguishable by their plumage as the Brown Wood-hen and the Black Wood-hen. In February, 1897, I exhibited, at a meeting of the Wellington Philosophical Society, a specimen (a fine male bird) which was wholly brownish-black, being the darkest I had seen. This, with six others of both sexes, came from the Waitara district, where, so far as I can learn, most of the birds are of dark colour. My specimens exhibit varying shades of colour, and in some of them the brown predominates; but on the whole they present a very different appearance to the ordinary bird, and, in addition to this distinctive feature, the plumage is more wiry in structure, with stiffened points to the feathers. Sir James Hector was the first to call my attention, some years ago, to the existence of this darker race of *Apteryx*, telegraphing to me from Gisborne to examine a live pair passing through Wellington on a homeward-bound ship; but I was anxious to see a good series of specimens before giving a name to it. As readily distinguishable from the typical chestnut-brown Kiwi, the species ought to have a name, and I think that we must adhere to the one proposed by Dr. Sharpe. His distinguishng characters for *Apteryx bulleri*, as compared with *Apteryx australis*, are "Blackish-brown instead of a tawny tint," and "the curious harsh structure of the plumage, especially of the feathers of the rump and neck." This diagnosis is applicable to this species only, and not to the lighter and better-known form, which will still retain the name of *Apteryx mantelli*.

Having already stated (p. 2) my reasons for keeping these forms distinct, it will be seen that I am quite in accord with Dr. Bowdler Sharpe's views on the question of sub-species as stated in the 'Catalogue of Birds in the British Museum' (vol. ii., p. 45) :—

> I can hardly expect that all ornithologists will acquiesce in my views as to the sub-species or races which I have believed it to be my duty to recognise. These races *do* exist in nature, and they may be called by whatever name naturalists please, 'varieties,' 'races,' 'sub-species,' 'climatic forms,' &c.; but it has seemed to me better to keep these forms, many of which are very well characterised, distinct from one another, than to merge them all as one species, and thus to obliterate all records of *natural facts*, which are plain enough to the practised eye of the ornithologist, though difficult to describe in words.

The range of *Apteryx bulleri* is co-extensive with that of *A. mantelli*, and it is not unlikely that they intermingle in their haunts, as do *Apteryx australis*, *A. oweni* and *A. occidentalis* in the South Island. It might, of course, be sufficient to treat this form as a melanoid variety of the common species, in which the prevailing colour is chestnut-brown; but, after what I have said under the head of *Apteryx lawryi*, my reason for treating it as a distinct species, under a name that has obtained currency, will be appreciated, and the name of *Apteryx bulleri* seems to me more convenient than the alternative trinomial one of *Apteryx australis bulleri*.* If a sufficiently

* I am old-fashioned enough to be wholly opposed to the trinomial system of nomenclature, now so much in vogue. The inconvenience of this practice is well illustrated in Dr. Hartert's recent *Birds of the Palæarctic Fauna*, in which he proposes to give three names to nearly every species treated of. Commenting on this, the Editors of the 'Ibis' write: "At times Mr. Hartert's plan results in such monstrosities as '*Pica pica pica*,' and '*Oriolus oriolus oriolus*,' and becomes almost ridiculous."

large number of specimens were obtained in the future, I should be inclined to treat in the same way the rufous-coloured Kiwi ("Red Kiwi" of the Maoris), of which an account is given in the 'Birds of New Zealand,' vol. ii., p. 310. In this case I was able to show, at any rate, that the characters were congenital; a chick having been captured with the parent bird showing the same peculiarities, in colour and open texture of plumage. But that does not carry us far enough, such an occurrence being not uncommon among ordinary albinoes.

I received four specimens from Waitara in October, 1896. The smallest of the adults proved to be a female, and the ovary contained a cluster of undeveloped eggs. Two of them were mère chicks, and were very dark in colour.

Of late a good many examples have been obtained in the wooded district south of New Plymouth, which is fast being occupied by settlers. Before I left New Zealand, a nest containing two eggs was discovered by a man who was felling bush on the property of Messrs. Stretton and Jobson. These specimens are now in the museum at Wanganui, and one of them, before being emptied of its contents, was found to weigh 15 oz. 90 gr.

Like the other members of this wingless group, *Apteryx bulleri* is suffering from the introduction into the country of stoats and weasels, and I fear that a few years, at most, will see the species extinct.*

The late Mrs. Halcombe (a daughter of the late William Swainson, the celebrated ornithologist and advocate of the quinary system), to whom I am indebted for several specimens of this species, wrote me from Waitara, on December 31st, 1901:—"I have just got a hen Kiwi with two little, wee chicks. It seems that in good years they begin to lay their eggs very early and continue the breeding operations till as late as June. Everything seems to depend on weather."

* Some time ago it was officially notified in the Government 'Gazette' that ferrets, stoats, and weasels are protected by law, their destruction exposing the offenders to a severe penalty! As a fitting commentary upon this the following paragraph appeared a few days later in the 'New Zealand Times':—"Stoats are reported to be very troublesome in the Hawera district. One settler reports that sixteen eggs out of eighteen were destroyed in one nest by stoats last week." And a correspondent of the 'Evening Post,' under the *nom de plume* of "Bushman," commenting on the *Gazette* notification, wrote: "I should like to know when this craze of a few faddists is going to cease, for it seems to me about time that some one entered a strong protest against the wholesale introduction of these pests into our beautiful adopted country. Any one who, like myself, has kept ferrets for years, must know that the habits of the animal are entirely against its ever doing any real good as an exterminator of rabbits, for, unlike a cat, a ferret will not hunt for the sake of hunting; and, as it almost always lays up and sleeps for two or three days after a heavy meal, this must militate against its usefulness. Again, ferrets and their congenitors will hardly ever touch fur, if they can obtain feathers, which is the reason that in many districts, where pheasants and quail were once plentiful, they are now nearly extinct. And the last, but greatest, evil is that ferrets are, and have been for years, killing hundreds, and I might say thousands, of lambs yearly all over the country. Now, I would ask, is it any use proclaiming such vermin as 'protected animals,' when the above facts are well known? Is it not merely inviting people to break the law? I have for years killed every ferret, stoat, or weasel that I could get a chance at; and many others that I know do the same, or we should have long since been plagued by a worse pest than the rabbits ever were."

APTERYX OWENI.

(OWEN'S KIWI.)

Apteryx oweni, Gould; **Buller, Birds of New Zealand, vol. ii., p. 327.**

The cry of this species is very much weaker than that of *Apteryx lawryi*, already described. As with that species, however, the sexes cry together—the cry of the male resembling the shrill cry of the Wood-hen, although not so loud, and that of the female being a husky screech.

In October, 1891, I made the following communication to the Wellington Philosophical Society:—"Mr. Percy Seymour, who has been residing some years at Preservation Inlet, collecting the birds in that locality for European museums, writes me, under date of the 17th July, 'I have ascertained that since this time last year *Apteryx oweni* has bred, at intervals of about seven weeks or so, no less than *five* times, if not *six*.' If this be the case there ought to be no difficulty in perpetuating the species, if the surrounding conditions are favourable. Whatever its fecundity may be, however, a wing-less species stands no chance whatever in the face of stoats, ferrets, and weasels, of which some thousands have lately been introduced by the Government and turned loose in all parts of the country, in the hope of suppressing the rabbits.* The only chance now of saving the various species of apterous birds is in their complete isolation. If Lord Onslow's proposal to set apart the Little Barrier Island in the North, and Resolution Island in the South as inviolable preserves, stocking them from time to time with all the desirable species and placing them under the strictest protection, be carried out, then we may hope to be able to save from extinction some, if not all, of these interesting forms. Failing that, their final extirpation is not far distant, and the student of the future will have nothing left to him but the dried specimens in European and colonial museums, and such memoirs of the indigenous species as the industry or opportunities of present observers may have furnished. I have done what I could, both by pen and pencil, to preserve a history of all these birds, but I believe we have yet much to learn respecting many, if not all, of them; and on every account it is most desirable that the birds themselves should be preserved, with, as far as may be possible, their natural environment."

A specimen in my collection, from the West Coast of Canterbury, is the nearest approach to a perfect albino that I have yet met with among individuals of this species, there being only a tinge of yellowish-brown on the plumage of the upper surface. As already mentioned, I have recorded five albinoes, all more or less stained with yellow or brown, and one partial albino, presenting only irregular patches of white.

I have in my collection a specimen of *Apteryx oweni*, from Collingwood, exhibiting a small

* "It is too late now to discuss the wisdom or folly of this introduction. But there is reason to fear that the colonists will soon become familiar with reports of the kind recently telegraphed from Palmerston North, as follows:—'A child named Just was attacked on Sunday morning, while playing on the racecourse, by four stoats, two of which fastened on to the child's neck, maintaining their hold until driven away by the child's parents, whose attention was attracted by the screaming of the child. A number of lambs were also found dead on the course, appearances indicating that their deaths had been caused by stoats.'"

white spot on each side of the throat, the curious feature, in this case, being that four other birds from the same locality are similarly marked.

I have received some specimens of this bird from Mr. J. Brough, of Nelson, differing from those obtained further south by the regular and distinct character of the barred and mottled markings on the plumage of both upper and lower surfaces. My correspondent says: "The birds sent are from the Buller River. This species inhabits the dense bush, and seems to prefer dark and gloomy gullies, where the sun scarcely ever penetrates, and where the underscrub is almost always dripping wet. In such places you will sometimes get a whole colony. The most I ever got in one batch was twenty-six birds, at the head of a gully such as I have described. For feeding they select mossy ground with few stones. Their favourite places are where a young growth of birch-trees has replaced the old forest. Individuals differ, however, very much in their habits. You will see by the sharpness of their claws that the ground roamed over by these birds is very soft. They camp by day in holes of fallen trunks of trees, and come out in the evening to feed."

I had several of these birds in confinement at the same time as the other species, and was impressed with their extreme gentleness of disposition, as compared with *Apteryx lawryi* and *Apteryx australis*. Any two males of the latter, placed together, will fight; but a number of *A. oweni*, confined together, will crowd into each other like pigs, on the best possible terms, as if seeking mutual warmth. They are even more docile than *Apteryx haasti*, allowing themselves to be handled almost without resistance, seldom striking with their feet, and only expressing their alarm or annoyance by an audible snapping of the mandibles. They require, too, to be handled gently, as the feathers come out on the slightest rough usage.

Mr. C. Robinson, who has spent much time in the South Island, collecting Kiwis, brought me on one occasion, for examination, an egg of this species. It was broadly ovoido-elliptical, measuring 4·4 in. in length by 3 in. in breadth; milky-white, and with a slightly-polished surface, showing a little discolouration from contact with the bird's feet during incubation. He found it in a hole formed by manuka-roots, and well concealed by the grass; but the dog scented it out and killed the bird on the nest. This was in September, 1888.

One of my correspondents, writing from the Karamea Saddle on the 6th April, says: "I expected to find Kiwis very plentiful here, but I have not yet obtained one, although I have been camped in these woods for three months. The forest is nearly all of red-birch, and, owing to the dampness of the woods, the ground is spongy and mossy, with an abundance of worms, which constitute the favourite food of this bird. The District Surveyor, who has an excellent retriever, has caught only two during the last four months. Wood-hens, too, are very scarce. I have collected a few of the brown-legged species. I have preserved them, and will send them to you on my return to Nelson. On the first of April, I came across a family of the red-legged species—male, female, and two young. I captured the two old birds and one young one, all of which I have preserved. The legs of the old birds were quite as red as those of our Wood-pigeon. The most plentiful bird in these woods is the little Rifleman. I have seen only one Saddle-back, which I managed to secure. I am camped at an altitude of 3,300 ft., and have not as yet seen any Tuis or Pigeons. I cannot say that I have actually seen any stoats or weasels here, but they are known to be on the Dart River and on the Rolling River, about fourteen miles from here." Once in the district, there is no withstanding their spread, and with it the absolute extinction of these vanishing species. Nothing can save them.

At a meeting of the British Ornithologists' Club, held on April 30th, 1894, Mr. Walter Rothschild remarked as follows:—

"About three weeks ago I received four living specimens of an *Apteryx* which were noticed, on their landing, to be very distinct. On careful examination I was at once struck by the

presence of cross-bars on the plumage, as well as by the longitudinal stripes usually seen in the plumage of *Apteryx mantelli*. Further investigation, together with the fact that the plumage on none of the four examples is identical, clearly shows them to be hybrids between *Apteryx mantelli* and *Apteryx occidentalis*. It will thus be seen at a glance that, while all specimens of *Apteryx haasti* are regularly barred, the hybrids between barred forms and striped forms of Apteryx show a mixed character of markings."

I have always been rather sceptical about hybrids among wild forms in a state of nature, although there are, of course, some well-authenticated cases. In this instance Mr. Rothschild set the matter at rest himself, five years later, by writing (*Nov. Zool.*, vi., p. 386):—"I evidently made a mistake about this, as they all lost the mixed appearance in their plumage, and could afterwards not be distinguished from ordinary *A. oweni*."

Apart, however, from the inherent improbability of hybrids in a state of nature, Mr. Rothschild's conclusion was obviously wrong, because *Apteryx mantelli* is an inhabitant of the North Island and *A. occidentalis* of the South. The only recorded instance of the occurrence of the latter species north of Cook's Strait is the bird mentioned by me as obtained near the summit of Mount Hector; and *Apteryx mantelli* is not known to exist on Mount Hector or in any part of the Tararua ranges. (See vol. ii., p. 328.)

Mr. R. Henry declares that on one occasion he found a little *A. oweni* hatching an *A. australis* egg, and that the egg had a chick in it.

One of my best correspondents, Mr. J. Brough, writing to me from the Pelorus, says: "I have now been camped in these woods for about a month—up one of the tributaries of the Pelorus River known as Wakamarina. I am camped a long way up the creek, at a place where I used to collect birds some years ago. In those days I found it a good hunting-ground; a great number of species could be then obtained in this locality; but now all this is changed. I seldom see or hear any birds worth collecting. The stoats and weasels have done their fell work. For three weeks I was camped right up amongst the mountains and in the heart of the bush, and I never saw a single Wood-hen, nor did I ever hear one. I heard one Kiwi calling, and I found one dead *Apteryx oweni* on the ground with its head and neck mutilated by the stoats. I do not now see or hear any Saddle-backs, or Pigeons, or Wrens, all of which were plentiful enough in this place a few years ago. The Blue Duck used to be fairly abundant in the creek, and they are now nearly extinct. This time I have seen only one pair. They had a brood of young ones, so I felt that I could not shoot them. They had six young ones when I first saw them. I have an opportunity of seeing them in the creek every day, and it is very interesting to watch them. But the young ones are getting fewer every week, and now there are only three left. I attribute this also to the stoats, which are very numerous about here."

An old settler at Wanganui, from whom I have received many specimens in the past, writes me: "Weasels have destroyed all game, and I think Wekas will share the same fate. I never see any. I have killed seventeen weasels on my place in three months; and of the many bad things introduced I think this the worst." And Mr. William Smyth, the well-known collector, writing to me from Dunedin, says: "I got only a few Wekas from Waimate last winter. They have practically disappeared from the Otago country."

I reproduce here two excellent photographs of *Apteryx oweni* by an amateur, Mr. William Reid, of Wishaw, Scotland, who was lately on a visit to New Zealand.

APTERYX OWENI FEEDING.

APTERYX OWENI : ANOTHER POSITION.

APTERYX OCCIDENTALIS.

(WEST-COAST KIWI.)

Apteryx occidentalis, Rothschild, Novitates Zoologicæ, vol. vi., p. 384.

This species is thus differentiated by Mr. Rothschild:—

♂ ad. Differs from the same sex of *A. oweni* by its larger size, and by the more distinct, more regular, and wider pale bars on the feathers and the more developed light tips to the latter. The wider pale bars to the feathers make the dark bars bolder, so that they stand out more conspicuously than in typical *A. oweni*. The reason for the greater distinctness of the pale bars in this form is their more regular outline as well as greater width. In most specimens of *A. oweni* they are not only narrower, but more or less irregularly V-shaped. Total length, about 480 mm.

♀ ad. Larger than the male, and generally darker. Total length, about 540 mm.

If the localities on our labels are correct, the distribution of my *A. occidentalis* is not easy to understand, but I believe it to be a fairly distinct form, perhaps representing the typical *A. oweni* on the high mountains of the Buller district, where it may occur together with *A. haasti*.

Confined for some time with the two pairs of *Apteryx lawryi* mentioned above (p. 6) was a spotted Kiwi, which I had purchased at the same time from Mr. Bills, of Dunedin. This bird appeared to me too large for *Apteryx oweni*, whilst there were other superficial points of difference. I concluded that it must be the young of *Apteryx haasti*, at that time a very rare and little-known species. It accompanied some other birds to Tring Park, and Mr. Rothschild informed me that it continued to increase in size for some months after its arrival. He ultimately made it the type of a new species, which comes somewhat near to *Apteryx oweni*, but may, I think, be differentiated by the characters he has given. Mr. Rothschild, however, is mistaken in supposing that this type specimen came from the North Island. Its only claim to that distinction was its being a captive for some months in my garden in Wellington. It was obtained by Mr. Bills at Dusky Sound, on the west coast of the South Island.

One thing was very noticeable in the character of this bird during its period of confinement with *Apteryx lawryi*. It proved to be of an entirely different disposition—less tractable and unceasingly restless. The large brown Kiwis were soon reconciled to their captivity, but the spotted one never relaxed its efforts to escape, perambulating the sides of the enclosure and trying the wire-netting with its bill with never-ceasing persistency. On one occasion it did manage to find, and then to enlarge, a hole in the netting. For some nights in succession it made the circuit of the gardens, retiring before morning to sleep with the others, whose larger size prevented their escaping by the same aperture. One evening I closed the entrance, and the next morning I found that the vagrant Kiwi, finding the passage barred, had trampled quite a track in the soft ground in his vain endeavours to regain his place with the others inside the enclosure. Then my dog traced the bird to its hiding place in the gardens, and it was restored to the yard, where for some days it remained perfectly quiet, and ceased its attacks upon the wire-netting.

To this species Mr. Rothschild refers the specimen, supposed at the time to be *Apteryx oweni*, obtained by Mr. Morgan Carkeek, near the summit of Mount Hector in the Tararua Ranges, in December, 1875.* It was caught by his dog, among the snow-grass, at an elevation of

* *Trans. N. Z. Inst.*, vol. viii., pp. 193-4.

about 3,000 feet. At a higher point he found the species comparatively abundant, and he also met with it occasionally below the snow-line, frequenting many places in the bush free from undergrowth.

Some time before leaving the Colony, I had an opportunity of examining some good examples of this species procured by an English tourist from a bird-dealer at Nelson. I remarked that the bill was very similar to that of *Apteryx oweni*, although the plumage, as already recorded, bore a general resemblance to that of *Apteryx haasti*, but was paler. The legs were dark-coloured, in which respect it agreed with the latter; and the claws were horn-coloured.

I think that Mr. Rothschild is in error in stating (*Ibis*, 1893, p. 575) that "on the west coast of the South and North Islands, *from one end to the other*, occurs a grey *Apteryx*, which has hitherto been confounded with the typical *A. oweni*." The only recorded instance, so far as I am aware, of its occurrence in the North Island is that mentioned above, although I have very little doubt that its range extends along the summits of the mountains flanking Cook's Strait. Whether it occurs, further north, is a mere matter of speculation. It has never been recorded, and the Maoris do not know of it.

It is fortunate that there is a good representative series of *Apteryx occidentalis* in the Tring Museum; for the opportunities of studying it are becoming diminished, year by year. To my own testimony, I may be allowed to add that of the late Professor Kirk, F.L.S., a very keen observer. Writing of that and the allied forms, he says: "All alike are extinct, or nearly extinct, over large districts in which they were formerly so plentiful, that explorers and surveyors calculated on their furnishing a considerable portion of the food-supply; but this is now entirely out of the question, and every year brings the date of their complete extinction appreciably closer. Their supply of food is indirectly reduced by the rabbits, which in some cases have invaded their haunts; their eggs are destroyed by Wekas and rats; and the adult birds are killed wholesale by stoats, weasels, wild cats, and occasionally by dogs which have escaped from domestication. The complete extinction of these interesting birds by agencies now in operation will not extend over a lengthened period."

The effect, too, of an indiscriminate introduction of foreign birds is to accelerate the threatened wiping-out of an avifauna admitted to be one of the most interesting in the world. Many of the species have already disappeared; a still larger number are, so to speak, on the border-land and will ere long be extinct; whilst even the commonest species exhibit year by year a steady diminution in numbers. What the result will be in twenty years from the present time, it is not difficult to predict.

I have had an opportunity of examining two eggs of this species, received from the West Coast, the male bird having been taken from the nest when sitting on the eggs. They are broadly elliptical and pale greenish-white. The larger of the two measures 4·6 in. in length by 2·5 in. in breadth. The other egg is about one-sixteenth of an inch shorter, and is much soiled by contact with the birds' feet.

HAAST'S KIWI.

APTERYX HAASTI.

(TWO-FIFTHS NATURAL SIZE.)

5

APTERYX HAASTI.

(HAAST'S KIWI.)

Apteryx haasti, Potts; **Buller, Birds of New Zealand, vol. ii., p. 330.**

General description.—Next in size to *Apteryx lawryi* of Stewart Island. The head is dark grey or sooty, instead of being light grey as in *A. oweni*, and the body plumage on the upper parts is black, spotted and marked with chestnut-brown, each feather being pointed with a lighter brown, instead of being dark grey, fasciated or irregularly banded with greyish-white as in *Apteryx oweni*. Some examples are strongly suffused with chestnut, and others, again, are much paler in their markings. The feet and toes are light grey in colour.

Young.—The whole plumage blackish-brown, paler and inclining to grey on the under-surface, and having a distinctly spotted character. This is produced by each feather having a single transverse band of pale chestnut-brown on its apical portion, with the minutest tip of the same colour. These spotted markings are entirely absent on the head and upper part of the neck, which parts are uniform greyish-brown, paler on the sides of the head. Tarsi and toes blackish-brown; claws black.

The type specimens of *Apteryx haasti*, now in the Canterbury Museum, came from Okarita, on the west coast of the Canterbury Province; the pair of living birds afterwards obtained by Mr. Bills, and sold to Mr. Dawson Rowley, of Brighton, are said to have come from a point much further south, but I have been unable to locate it. All my specimens (and I obtained, from first to last, a large series) were collected on the western watershed of the Heaphy Range, further north. Most of them were procured on the wooded spurs running into the valley of the Heaphy, on the north side, with a sunny aspect, but a few of them on the river flats below.

Mr. Rothschild was of course entirely mistaken in stating* that "*Apteryx haasti* is also found in isolated places in the King country in the North Island," and I cannot imagine whence he derived that impression.

As already mentioned, I placed a living pair on the Papaitonga Island, in 1893, recording the occurrence thus in a communication to the Wellington Philosophical Society:†—"Lovers of natural history will be glad to learn that this very rare species of Kiwi from the South Island—of which there is only a pair in the Canterbury Museum, placed there twenty years ago, and not another known specimen in any other public museum, either in the colonies or in Europe—has been successfully introduced into the North Island. Some months ago I received a fine pair from the South Island, and, after keeping them for some time in my Kiwi enclosure, in order to study their habits, I liberated them on a wooded island, a little over an acre in extent, near my homestead at Papaitonga. I placed on the island at the same time a pair of the small Grey Kiwi (*Apteryx oweni*), and, a short time previously, a single North Island Kiwi (*Apteryx mantelli*), kindly presented to me by Mr. Drew, of Wanganui, for that purpose. The locality is admirably suited to such an experiment, the ground being similar to that which the Kiwi frequents in its natural state, and well covered with native vegetation. Being on an island surrounded by a fresh-water

* *Ibis*, 1893, vol. v., p. 575. † *Trans. N. Z. Inst.*, vol. xxv., p. 87.

lake, about 150 acres in extent, and all within my private property, they are not likely to be molested in any way. But to prevent any chance of Maori depredations in the breeding season, I have also placed on the island three large live tuataras, kindly supplied to me by Captain Fairchild. The fame of these lizards, of which the Maoris have a most unaccountable dread, has spread far and wide. I have named them after three noted dragons of the past, Peketahi, Whangaimokopuna, and Horomatangi; and the Kiwis could not have three better guardians, for with this dread of the *ngarara* no Maori will ever willingly set foot on the island. The birds are apparently doing well, for the shrill calls—of the male and female responsively—may be heard every night, the effect across the still waters of the lake being very pleasing. I had intended to add a pair of Kakapo (*Stringops habroptilus*) to this little island community, but, unfortunately, one of them died, and the other effected its escape, before I could accomplish my object. I fear I shall not now have an opportunity of doing this till after my return from England. The Kiwis, however, may be looked upon as fairly established there; and it will be interesting to note whether, within their now circumscribed home, the three species will interbreed or not. An experiment of this kind could not be carried out under more favourable conditions, and I shall not fail to inform the Society hereafter as to the result."

I had afterwards six live specimens of *Apteryx haasti* in my possession for some time, and was much impressed with their gentle character, as compared with that of *Apteryx mantelli* and *A. lawryi*. Whilst they were in my enclosure—a period of a month or more—they never, so far as I am aware, uttered a single cry, in which respect they differed entirely from the other noisy species. They were very tame from the first, allowing themselves to be handled without much resistance. They had been caught in the wooded country near the Buller River, and were placed at once on meat food, in lieu of earthworms. Three of them pined away and died, having wasted to mere skeletons, being unable apparently to adapt themselves to the new and artificial conditions of life. The other three took readily to their new diet—raw minced beef and ox-heart—and became at the end of the month quite fat and heavy. I then shipped them to Mr. Rothschild, who received them in excellent health and condition.

A specimen sent to me by the Curator of the Nelson Museum for examination was either a male or half-grown female:—Plumage very dark, the prevailing colour being dark brown, with indistinct spots of paler brown, the latter appearance being due to each feather having a bar of that colour immediately below the produced filaments; the head and neck almost as dark as the rest of the body. A distinguishing character is that all the plumage, and particularly that of the upper parts, has a spiny character, the shafts of the feathers being produced beyond the web as in *Apteryx mantelli*. This character is most pronounced on the back, where the stiff black shaft is produced fully three-quarters of an inch beyond the web. The bill is horn-coloured, with pale brown tips; legs blackish brown; claws paler and very sharp.

In Mr. Rothschild's beautiful collection of New Zealand Birds at Tring there are two partial albinoes of this species. They are male and female. The former has the crown of the head, face, throat, and an irregular narrow stripe down the fore-neck dull greyish-white; on the shoulder, breast, and back there are likewise a few scattered feathers of pure white. The female, which is an exceptionally large specimen, has a broad, irregular, transverse band of yellowish white on the under part of the body; rest of the plumage normal.

From a fresh specimen I obtained the following measurements:—*Adult* ♀. Length, to end of tail 29 in., to end of outstretched legs 41 in.; culmen, from anterior edge of cere to the tip, 5·25 in.; along the edge of lower mandible, from the angle of the mouth, 6·25 in.; tarsus, 3·50 in.; middle toe and claw, 3·50 in. (the claw being 1 in.); hallux, 0·75 in.; middle circumference of tarsus, 2·50 in.; circumference at junction of phalanges, 4·25 in.; humerus, 2 in.; cubitus, 1·50 in.; spur, 0·25 in.

It is now perfectly clear that Hutton was right in referring the very large "foot of a Kiwi," received some years ago from Collingwood, (on which Verreaux founded his *Apteryx maximus*,) to this species.

Two eggs of this rare form were collected by Mr. Charles Robinson on the Heaphy Ranges, on the west coast of the South Island. The larger of these, measuring 5·25 in. by 3·25 in., was taken, in a perfectly fresh state, on the 20th December, with the female bird, under a grass tussock. The male bird was found by the dog, also under a grass tussock, some distance away. The other egg, which is about one-eighth of an inch shorter, was taken (with a single bird on the nest) on the 26th January. It unfortunately got cracked through the struggles of the captive bird, and was found to contain a well-advanced embryo. Both eggs were much soiled by contact with the bird's feet, especially the one that had been long incubated; but, on being washed, they disclosed a shell of a pale greenish-white. In form they are broadly ovoido-elliptical, the smaller one being almost a perfect ellipse. These unique specimens are now in the Rothschild Museum, at Tring.

I afterwards had an opportunity of examining another egg of this rare species, taken from a Kiwi's underground nest in the Heaphy Ranges. It is broadly elliptical in shape, measuring 4·75 in. in length by 2·75 in. in breadth, and is of a pale greenish-white hue. It was obtained in the early part of December, 1894, and was perfectly fresh.

I have had for a long time in my possession some interesting notes supplied to me by a collector whom I sent into the Heaphy Ranges, in the summer of 1892-3, specially in quest of *Apteryx haasti*. I have hitherto refrained from publishing these notes, from a desire to protect this Kiwi from the professional bird-hunter; although I fear such precautions are now of little avail against the inroad into our fair country, through official instrumentality, of stoats, weasels, and polecats. The last intelligence concerning the spread of these destructive animals is contained in a letter lately received by me from Mr. H. C. Field, C.E., of Wanganui. He says: "My son Charles—who for several years has been laying off and constructing roads for the Government in the country between the Tongariro Range and the Upper Wanganui—informs me that the weasels have become extremely numerous in the region where he has been working, and are destroying the Wood-pigeons wholesale. He says that, as those birds roost low down, among scrubby bush, the weasels climb up and attack them,—that in walking through the bush he has constantly come across the remains of Pigeons lying on the ground, and that, on examining those freshly killed, he found in every case that they had been bitten in the neck, so that the blood might be sucked out, after which the body was left. This clearly indicates the weasel's work. He tells me that, in consequence of this, the number of Pigeons in that region has very perceptibly decreased during the last two or three years, and he believes that in a very few years more the birds will be extinct thereabouts. He thinks that the weasels have come from the Auckland side, as he has heard that some were turned out in the Waikato for the purpose of destroying the rabbits. I am sure that my son's information about the killing of the Pigeons may be thoroughly relied on. No doubt other birds are being destroyed also; but the larger size and more conspicuous colour of the Pigeon renders their remains more noticeable." If perching birds suffer to this extent, how must it fare with Kakapos, Kiwis, and Wood-hens? That all these flightless species are doomed to rapid extinction goes without saying; and every lover of natural history will therefore learn with delight that, under the direction of the Otago Acclimatisation Society, Resolution Island is now being stocked with all these vanishing forms, so that there is yet a chance of a remnant being preserved for the naturalist of the future. The Little Barrier Island having been taken over by the Auckland Acclimatisation Society, we may look for excellent work there also.

As the reason for suppressing the notes no longer exists, I have abstracted the following

from the journal of Charles Robinson, whose instructions were to enter every particular in his diary :—

Dec. 9th, 1892. Started by the s.s. *Mawhera* at 11 p.m. for Westport. Arrived there 7 a.m. Friday (Dec. 11th). Went on to Waimangaroa, nine miles along the coast. Tramped along the beach to Makonui arriving at 8 p.m., thus completing twenty-seven miles of the journey.

Dec. 12th. Went along the coast ten miles; bad walking over big rocks. Camped about 5 p.m. Too tired to reach Wanganui that night.

Dec. 13th. Three miles to Wanganui. Reached Karamea River at night.

Dec. 14th. Crossed to Karamea; started at noon and travelled nine miles towards the Heaphy. Heard Kiwis crying out from the nine-mile creek where we camped last night.

Dec. 15th. Hunted Kiwis. Caught Wood-hens (*Ocydromus earli*).

Dec. 16th. Started at 5 a.m. Had gone a mile along the coast, when we came to a sandy beach. Here we saw a large bird-track in the soft sand—three front toes and a long one behind—with a stride of from 16 to 18 inches. Reached the Heaphy at 6 p.m. Went up river about a mile to get fresh water, and then camped. Plenty of Wood-hens here; and heard a few Kiwis calling.

Dec. 17th. Stopped in camp. Cleared overgrown track along sideling. Got two Kaka's eggs from a hole in a tree; there were three, but one got broken. Having to cut a track with the bill-hook through thick kiekie and kareao, we came upon Wood-hens, of which the dog caught several.

Dec. 18th. Up at 4 a.m. Travelled five miles up the river-bank in the rain, and pitched another camp. Dog caught several Wood-hens.

Dec. 19th. Up early, looking for track which leads over the range to Collingwood. Raining in torrents. Returned drenched to camp.

Dec. 20th. My son got two Roas (*Apteryx haasti*), our first specimens, and one egg, under a tussock. Found a large bird (female) with the egg; the other bird was in a different place—also under a tussock. (These specimens unfortunately got spoilt by the weather after skinning. They were lighter in plumage, and larger in the body than any of those brought home).

Dec. 21st. Two more *Apteryx haasti*. Found old survey track, which we followed up the spur of the range. Shifted camp.

Dec. 22nd. Got two Grey Kiwis (*Apteryx oweni*), which we found together in a hole among the roots. The Wood-hens, which were so numerous on the Heaphy flats, are very scarce on the ranges. Met with an enormous rata tree, which measured sixteen feet through!

Dec. 23rd. Shifted camp a mile and a half further up the river. Got seven Wood-hens, and three eggs of same. No Kiwis, although the dogs tired themselves out with hunting.

Dec. 24th. Got two *Apteryx haasti*, also Wood-hens and their eggs.

Dec. 25th and 26th. Remained in camp. There was a great flood in the river in consequence of the incessant rain, the water having risen twenty feet above the ordinary level in a few hours.

Dec. 27th. Severe gale blowing, with heavy showers of rain. Moved camp two miles further up. Got two Roas (*Apteryx haasti*). Skinned one; the dogs having spoilt the other, we had it stewed for supper. Good eating, and very different to the Grey Kiwi, which has a flavour like tar.

Dec. 28th. Left camp, and travelled up spur, reaching saddle between Heaphy and Collingwood. Very rough travelling. Camped there. Two Roas.

Dec. 29th. Saw two men working on track. They said they had heard Kiwis calling, but had never caught or seen any. Weather cleared up, but there were no birds.

Dec. 30th. Came down from the saddle, and shifted camp two and a half miles lower down. We got three Petrels (*Majaqueus parkinsoni*), each of them occupying a separate hole among the roots. There was one egg in each nest, and the bird fought hard on being captured.

Dec. 31st. Left camp and went down the river about four miles. Pitched fresh camp in pouring rain; provisions getting scarce.

Jan. 1st, 1893. Still raining. Travelled two miles and pitched camp. No birds, but caught some eels.

Jan. 2nd. On going down to-day met with accident and slipped into the river with baggage, thus getting some of the specimens damaged. There was an almost impervious tangle to go through—principally kiekie and supple-jack. The slopes are covered with black birch and red birch, with scattered rata trees. There

are no wild cattle or pigs. Nor did we meet with any rats, with the exception of one feeding on konini berries. Plenty of Wood-hens, and eels in the river.

Jan. 3rd. Tramped twelve miles along the track back to Karamea, to fetch provisions. Very tired, and went to sleep at nine o'clock without any supper.

Jan. 4th. Reached Karamea at night.

Jan. 5th. Started back with provisions. The Heaphy flats are covered with splendid feed for cattle—young karaka, koromiko, pekapeka, and tupakihi; but very inaccessible.

Jan. 6th. Camped at Nine-mile Creek. Bad weather. Dogs worked well, but no birds.

Jan. 7th. Hunting again, but to no purpose.

Jan. 8th and 9th. No birds. Caught four eels.

Jan. 10th and 11th. Went three miles up Heaphy River. Got one Roa (*Apteryx haasti*).

Jan. 12th. Got two large Roas and two chicks; one of the latter was in a hole among the roots, the other was running with the old birds.

Jan. 13th and 14th. Shifted camp. No Kiwis. Heard a Kakapo for the first time.

Jan. 15th. Bush very rough. Hunted all day, and got one Roa. On the ridges of the wooded ranges we found more Petrels (*Majaqueus parkinsoni*): always on the spurs facing the sea, and generally with an open space in front of their burrow, so that they can get way on when commencing flight.

Jan. 16th to 20th. Worked very hard and continuously with the dog. Added altogether three Grey Kiwis and one Roa to the collection.

Jan. 21st and 22nd. Very rough bush. Got three more Roas, all of which were found under overhanging shelters of limestone rocks.

Jan. 23rd. One Roa, quite unhurt. Made a pen for it.

Jan. 24th. Added two live Roas. They did not attempt to burrow.

Most of the Roas obtained by me were found on the wooded spurs running into the valley of the Heaphy, and particularly on the north side, with a sunny aspect. I heard a few on the southern side, but I never got any there. We were now hunting at a place about five miles from the mouth of the Heaphy River, and twenty-six miles from Karamea. There being no roads or tracks, and the vegetation being very dense, it was hard work.

Jan. 25th. Shifted camp to near mouth of river. Carried the live birds in canvas sacks with air-holes cut in them. Found some young Kakas, but could not carry them.

Jan. 26th. Got one Roa, and an egg, which unfortunately came to grief. It contained a nearly hatched chick. I may here remark that only the breeding Roas were found in holes or hollow logs: all the others were in rather exposed places.

Jan. 27th to 31st. During the last five days we got six Roas, as the result of very active hunting. We had now six live ones, and it took us all our spare time to dig worms for them.

Feb. 1st. Shifted camp to Nine-mile Creek.

Feb. 2nd. Got two Roas, and one very young one. Found a young Petrel, but it soon died.

Feb. 3rd. Raining hard; and as I found it difficult to look after the live birds and protect the specimens from the weather at the same time, I closed the hunting campaign and started homewards, reaching Wellington nine days later.

On questioning Robinson, I elicited one curious fact. On the western watershed of the Heaphy Range, where, as a rule, *Apteryx haasti* alone is found, the loose ground is inhabited by a very large earth-worm, on which this species principally feeds. On the eastern side, where the small Grey Kiwi (*Apteryx oweni*) abounds, this large worm is not to be found, its place being supplied by a very small earth-worm on which this bird seems exclusively to subsist. The summit of the main range—for a tract about a mile in width—distinctly divides the range of one species from that of the other.

May not this remarkable difference in the natural food-supply have influenced the development of these two closely allied species in divergent lines—the one being now distinguished by its massive skeleton and robust proportions, and the other by its slender structure and generally feeble development? The general style of the plumage is the same in both, it being easy in a

sufficient series of specimens to trace a gradation from the dappled brown plumage of *Apteryx haasti* to the dappled grey plumage of *Apteryx oweni*. *

A pair brought home alive by Mr. Bills in 1873-4 were purchased by the late Mr. Dawson Rowley, of Chichester House, for £100, and these birds (afterwards figured in the 'Ornithological Miscellany') are still in the Rowley Collection at Brighton. Where these came from I do not know, but the whole of my specimens were obtained in the wooded spurs at the northern extremity of the Southern Alps, known as the Heaphy Ranges.

As far as my experience goes, this species may at all ages be distinguished from *Apteryx oweni* by its perfectly black hallux, or hind claw.

Specimens of *Apteryx haasti* are still rare in collections. There are two in the Canterbury Museum, where they were placed twenty-five years ago, one becoming the type of the species. The Tring Museum possesses a remarkably fine series. I have presented specimens to the Cambridge University Museum, and to Wellington, Auckland, Hawke's Bay and Wanganui Museums. There is a good series in the beautiful collection of New Zealand birds in the Liverpool Museum; and I have presented specimens to the Zoological Museums at Berlin and Dresden. So far as I am aware, there is only a single specimen in America, and this is in the Niagara Falls Museum, in the State of New York, where it was sent by me as an exchange. Mr. J. D. Enys, of Penryn, Cornwall, possesses a pair (beautifully mounted by Messrs. Rowland Ward & Co., of Piccadilly), and Mr. Charles Storey, of Lancaster, possesses another pair. There is also a pair in the British Museum.

To Mr. Rothschild's paper, already mentioned, Mr. Frank Beddard, F.R.S., has added some valuable notes on the anatomy of the genus Apteryx (*Novitates Zoologicae*, vol. vi., p. 395) from which I extract the following:—

"The general muscular anatomy of *Apteryx* has been described by Owen; Garrod dealt subsequently with certain muscles of the thigh, and with the deep flexor tendons; Fürbringer has carefully gone into the shoulder muscles of the wing, correcting Owen in several particulars; finally, Gadow's book upon birds contains the bulk of what is known concerning the musculature of Apteryx . . . . *Apteryx oweni* perhaps differs more from the rest than they do among themselves: it is to be distinguished by its smaller size, the character of its plumage, the three open rings of the trachea below, and the great length of the pre-pubic process, besides possibly a number of minor points. *Apteryx haasti*, although looking like a larger edition of *A. oweni*, differs in the last two features just mentioned. *Apteryx mantelli* and *A. australis* are closely allied to each other, and come very much nearer to *A. haasti* than to *A. oweni* . . . . The general anatomy of *Apteryx* has been apparently so exhaustively treated of that I had hardly hoped to discover any new points. I have, however, been able to ascertain two new facts of some little classificatory importance. The first of these is the existence of an oil gland hitherto overlooked, a feature in which this genus appears to differ from all other Struthious birds; the second matter is the presence of definite intrinsic syringeal muscles, not unique among the Struthiones, but new to *Apteryx* so far as recorded fact enables me to judge."

* This view having been published, Mr. Dall wrote to me:—"I don't agree with the supposition in regard to the divergence of *Apteryx haasti* from *A. oweni*, as the large worm is found on the eastern watershed, and there are plenty of large worms in the alluvial flats around Collingwood, although not quite so large as the other. There are three distinct kinds of earthworm on the Gouland Downs and Heaphy. I have heard of them being five feet in length, when stretched out fully, but these are exceptional ones."

SOUTHERN MEGAPODE.

Sub-class NEOGNATHÆ.

MEGAPODIUS PRITCHARDI.

(SOUTHERN MEGAPODE.)

Megapodius pritchardi, Gray, Ann. Mag. N. H. xiv., p. 378 (1864).

Megapodius, Sp., Cheeseman, Trans. N. Z. Inst., vol. xxiii., p. 219.

Mr. Cheeseman, in his very interesting account of the Birds of the Kermadec Islands (*l. c.* pp. 216-226), mentions that a Mr. Johnson, who resided on Sunday Island, in that group, for a period of fifteen years, described to him a species of Megapode which existed there prior to the eruption of 1876, inhabiting the floor of the large crater, where it made mounds of sand and decayed leaves from two to three feet in height, and deposited its eggs therein to be hatched by the artificial heat. Mr. Johnson stated that he had been in the habit of visiting these mounds for the purpose of collecting the eggs and young birds, and that he frequently took five or six of the latter from the same nest at one time. The eruption of 1876 covered the floor of the crater with a deposit of volcanic mud, and apparently extirpated the species, for it has never been met with since. Mr. Cheeseman recalls the fact that a species of *Megapodius* inhabited the crater-basin of Nuiafoou, in the Tonga group, which is not further removed from Sunday Island than the mainland of New Zealand; and as the Kermadec Islands do not contain any endemic species—all but one, if not all, the known land-birds being common to New Zealand also, and the sea-birds frequenting also either our waters or those of Polynesia—he suggests that the extinct Sunday-Island Megapode and that inhabiting Nuiafoou were identical. Knowing how persistent the various species of Megapodes are in their local distribution, I have no doubt whatever in my mind—notwithstanding the apparent difference in their nesting habits—that Mr. Cheeseman is right in his conjecture, and therefore consider that I am justified in adding to our list of New Zealand birds *Megapodius pritchardi*, of which fortunately I am able to give some particulars, obtained from a correspondent at Nuiafoou.

The Rev. Shirley Baker, the first Premier of Tonga, stated at a meeting of the Auckland Institute* that this bird is confined to the immediate vicinity of a deep crater-like lake on the small island of Nuiafoou, to the northward of Tonga, and that in the light soil it excavates tunnels, often six feet in length, and deposits therein its eggs, sometimes twenty in number, leaving them to be hatched by the natural heat of the sun.

As far back as 1870 I minutely described (*Trans. N. Z. Inst.*, vol. iii., p. 14) a specimen of this bird in the Auckland Museum obtained from one of the Friendly group and presented to that institution by Captain Rough.

The whole of the plumage dark cinereous or slaty-brown, inclining to grey on the abdomen and under tail-coverts; tinged with reddish brown on the back and upper surface of wings; the outermost primary dark brown; the rest ashy-grey with white shafts in their basal and middle portion, darkening into brown towards the tips. Bill, dark horn colour; feet, dark brown; irides, reddish brown; bare space on the lower cheeks and

* *Trans. N. Z. Inst.*, vol. xxvii., p. 452.

upper side of neck fleshy white. (Although absent in this specimen, most examples have a patch of white covering the basal part of the primaries and secondaries, the extent varying in almost every individual. Some also have white markings on the upper tail-coverts and basal part of the tail-feathers, whilst in others again the bare neck-space inclines to red.*) Extreme length, 11·5 inches; wing, from flexure, 7·5; tail, 2·5; bill, along the ridge, ·5; along the edge of lower mandible, 1; tarsus, 2; middle toe and claw, 2; hind toe and claw, 1·75.

Plumage soft but compact; wings, short and rounded, indicating very feeble powers of flight; legs strongly formed; toes furnished with ample claws; middle and outer toes nearly equal; inner toe ·5 of an inch shorter.

I am able now to add a description of the young, of which a figure is given in the accompanying plate:—The whole of the plumage dull chocolate-brown, much paler on the throat and abdomen; the mantle and upper wing-coverts varied with transverse wavy markings of yellowish-brown and black. In another specimen, which I have presented to the British Museum, the throat and abdomen, as well as the crissum, are pale yellowish-brown, and the markings on the upper surface are much lighter.

On my last visit to the Tonga group, in 1897, I heard a good deal about this solitary Island-Megapode, and obtained from Captain Smith a slightly damaged specimen of its egg. In the end I succeeded in getting into communication with Mr. B. W. Hamilton, a resident on the island of Nuiafoou, and with this gentleman's kind aid I obtained a beautiful series of both sexes and all ages, preserved in spirit, besides a number of eggs, showing a remarkable gradation of colour. But before asking Mr. Hamilton to do me this service I found it necessary to get a "permit" from the King of Tonga. At the instance of his Premier (the Rev. S. Baker) the King had, some years before, placed the bird under his special protection by proclaiming it *tapu*, the eggs being regarded as a great delicacy, and distinguished by the natives as "King's food." Here I also invoked the assistance of my old friend and schoolfellow, the Rev. J. Watkin, chaplain to the King, who explained that the birds were required for scientific purposes; he had then no difficulty in obtaining the required permission, which was granted freely and without any limitation.

At my request Mr. Hamilton committed to writing all the information he could give me, and as his notes are very interesting, I offer no apology for reproducing them here, *in extenso*:—

The Malau differs from most other Megapodes in this respect, that, so far as I have been able to observe, it is not a 'mound builder,' but a 'digger.' It is not by any means plentiful on the Island, although it was more often seen before the volcanic eruption here in August, 1876. It is also a very shy bird.

This island (Nuiafoou) is very small, being about twenty miles in circumference, having a large lake in the centre, the lake being from $2\frac{1}{2}$ to 3 miles in diameter. It is in the interior of the island, in the black sand around the lake, that the Malau chiefly lays her egg. The bird does not choose the flats but generally fairly steep faces, and at some distance above the level of the lake. The bird digs or scrapes a hole in the sand, lays the egg, and then refills the hole; the next bird excavates, then raises the egg already laid, and deposits its own egg underneath; and so on, till there may be as many as sixteen eggs in the one hole, the first laid egg being always on the top and the freshest egg always at the bottom. If one of the holes is discovered, its course is very easy to follow, as the sand there is free, and it is always considerably warmer than the surrounding soil. If this warmth be absent, one may be quite certain that the hole is deserted and that no eggs will be found. The heat must be generated when the birds are in the hole, as of course the volcanic heat would be the same in the surrounding sand. There is no sign whatever of any decaying vegetable matter. The eggs seem to require very little extra heat or care to incubate them, as I have had

* Never having had the opportunity of examining a fresh bird, I wrote to Mr. Hamilton for information on this point, and he replied: "The colour varies from a dirty flesh-colour to a dull reddish colour in the male bird. There is never any decided red tinge on the neck of the female Malau, nor is there any very bright colour on the neck of the male—only a dull, dead, red colour."

eggs hatched in my desk where I had put them and almost forgotten them; but a freshly laid egg would require more attention.

The Malau roosts in a tree and not on the ground, as might have been supposed, and generally not more than one in a tree. I think the bird lives entirely on small animal and insect life. Their eyes are of a lightish brown with a dark centre. They are difficult birds to keep in captivity. I have tried both adult birds and also the young. I have fed them on cockroaches and termites (white ants) but have never managed to keep them for more than about six weeks. The Malau runs fast and also takes short flights of from fifteen to twenty yards, but never rising more than two or three feet from the ground. The way I manage to take them alive as a rule is this: I get together a host of native youngsters and run the bird down. The Malau does not fly except for short distances, and then, as already stated, only close to the ground. I have given you all the information I possess about the bird, and I do not think that any white man can give you more personal information than myself; for I believe I am the only one who, without native help, has discovered the nest and taken the eggs. It is no use to rely upon information derived from the natives, especially where they are anxious to appear to know everything. They have, further, that wretched fault of trying to say anything that they think will please you.

Dr. Friedlander spent three weeks here in 1897, and was unable to procure a single specimen of the adult Malau, and only one nestling.

I have not sent any specimens to Europe, and I shall not do so, as I consider that you have a prior claim. Now that I possess your beautiful work on the 'Birds of New Zealand,' and have been able to make a study of the subject, I look forward to much pleasure and profit when I get back to my old haunts in the Colony by having, as it were, the beauties of the scene pointed out to me.

Of the birds sent to you I procured as many as I could alive, so as to have the specimens uninjured, capturing some when they had entered their holes to lay. In new places the eggs may be found a foot or more below the surface, but the older holes are much deeper. I have myself found from one to as many as fifteen eggs in one hole, and I have heard of even more being sometimes found. Of the nestlings sent some were taken from the holes, just after quitting the eggshell, and one of them was hatched out in my desk where I had placed some of the eggs for convenience.

One of those sent was in a hole, where it had gone to lay its egg, and I put it into the tank with the egg still inside it. The birds dig or burrow in the sand to a depth of four feet, or more, then lay their egg and replace the sand. I am unable to determine the sexes, but I hope there may be specimens of both male and female. They are precisely alike in outward appearance, and the sex can only be satisfactorily determined by dissection.

Curiously enough, from the Kermadec Islands (as I shall mention further on) I received a pair of the small Swamp Crake (*Porzana plumbea*) and also a specimen from the Island of Nuiafoou, shewing how persistent this form also is in its local distribution, although in reality, like the Megapode, a very weak-winged bird.

Of course it will be noticed that the Nuiafoou Megapode is not a mound-builder, and, according to Mr. Johnson's account, the species formerly inhabiting Sunday Island formed mounds of sand and decaying leaves two or three feet high; but, if the latter observation was accurate, it may have been due to circumstances of locality and environment, and by no means negatives the assumption of these birds being of one and the same species.

One of the chicks in my collection was the gift of Mr. James Mills, the General Manager of the Union Steamship Company. When on a visit to the Tonga group, someone gave him a Megapode's egg, and it was hatched out in his cabin during the voyage to New Zealand. It did not long survive its birth at sea; and, on reaching Auckland, Mr. Mills advised me of it by telegraph, and the specimen reached me at Wellington in perfectly fresh condition. This is the example figured in the plate, looking very like a small Tinamou.

The eggs of this Megapode are very elliptical in shape, an average one measuring 3·20 in. in length by 1·75 in. in breadth. They vary somewhat in size as well as in colour. They are usually of a warm cream colour; but the specimens in my possession vary from yellowish-white to a rich cream colour, whilst one or two are of an uniform pale yellowish-brown.

COTURNIX NOVÆ-ZEALANDIÆ.

(NEW ZEALAND QUAIL.)

Coturnix novæ-zealandiæ, Quoy *et* Gaim.; **Buller, Birds of New Zealand, vol. i., p. 225.**

On my last visit to Christchurch, I had an opportunity of examining an exceptionally fine pair of skins, formerly in the collection of the late T. H. Potts. As comparatively so few specimens of this extinct bird now exist, I think the notes I made on that occasion are worth recording.

Ad ♂. Has the throat and cheeks pale chestnut, of which colour also there are irregular patches mixed with the ordinary plumage of the breast, the whole of which, as well as the upper part of the abdomen, is marked with small patches of black, presenting together a very handsome appearance; the lower abdomen to the vent is pale fawn colour; and the long plumage of the sides overlapping the femora is very showy, each feather having a central spot of yellowish white. The feathers of the hind-neck, shoulder, and back, the scapulars and wing coverts, and indeed the whole of the plumage of the upper surface, exhibits fine-pointed shaft streaks of yellowish white.

Ad ♀. Very dark as compared with the specimens in my collection. Crown and sides of the face dark brown varied with pale brown; throat pale fawn colour without any markings; feathers covering sides of the body marbled with black and with conspicuous shaft streaks of white; the feathers of the breast and under parts presenting black horse-shoe markings; the scapulars black with pale brown edging and a distinct white shaft line, and sparingly marked with wavy bars of chestnut. The yellowish-white or pale fawn-coloured throat corresponds to the chestnut throat of the male, but the patch of colour on the latter is more extensive and conspicuous.

It is said that a specimen of the New Zealand Quail was obtained on Racecourse Island in the Okarita Lagoon as lately as the year 1871, but there is no absolute evidence of it. If true, this individual bird must have been about the last of its race.

After closing my account of this species in the 'Birds of New Zealand' (vol. i., pp. 225-228)—in which I had said, "it is probably now extinct, for no specimen has been heard of for at least twelve years"—I added a footnote to the effect that, after the article had been sent to press, I had received from the Colony the welcome intelligence that the last refuge of this expiring species had just been discovered at the Three Kings, a group of small islands situated about thirty-two miles west-north-west of Cape Maria van Diemen. The 'Hinemoa' had called in there on her return from annexing the Kermadec Islands, and those who landed reported having seen several bevies of New Zealand Quail, which were described as being comparatively tame and fearless. Mr. Cheeseman (who was one of the party on that occasion) visited the islands again; and, writing to me on the 10th June, 1890, he said: "I obtained a nest with five eggs of the Quail when at the Three Kings, last summer. I almost trod upon the bird; in fact, she rose between my feet; and glancing downwards I saw the eggs. I had no gun with me at the time, and consequently the bird escaped. I spent one morning hunting over the island with a gun, but never got the chance of a shot, although I started three or four couples. They are by no means plentiful. I do not think I saw over a dozen the three days I spent on the island."

The belief that this species yet survived, resting on apparently good evidence, was destined to end in disappointment. Mr. Cheeseman kindly gave me one of these eggs, and I saw at a glance that it was not that of our New Zealand Quail, but of *Synœcus australis*, the Brown Quail of Australia, which has been introduced into New Zealand, and is now extremely plentiful in all parts of the country.

The migration of this species from the mainland to the Three Kings is a very curious fact, and illustrates the manner in which species become naturally dispersed; for it is impossible to suggest any valid reason why this small Quail should have undertaken a voluntary sea voyage in order to establish a new home for itself, unless, indeed, it would be to escape the instinctively ravages of the stoats and weasels introduced into New Zealand by a misguided Government! Whether so designed or not, the location at the Three Kings would furnish them with a sanctuary in this respect.

Referring to the three specimens in my collection received from Mr. A. C. Purdie, that gentleman wrote to me:—"They were obtained on a small island of about twenty acres in Blue Skin Bay about the year 1867 or 1868." The two specimens in my son's collection represent the adult and the young male. The former of these was shot by Major Mair in the Whangarei district, in the year 1860, being the last known specimen killed in the North Island; the other was obtained by myself, near Kaiapoi, South Island, in the summer of the same year.

The female of this species is very similar in appearance to that of the introduced Australian Quail, *Synœcus australis*, now, as already mentioned, very numerous in New Zealand; and I have had specimens sent me from all parts of the Colony for identification; the owner in every case believing that a prize had been secured. Although, however, very much alike in general appearance, on placing the two kinds side by side the differences of plumage are very manifest. The most noteworthy points are these: in the Australian bird the plumage of the under surface—and particularly that of the sides—is marked with transverse arrow-head bars of brownish black; in the New Zealand bird the markings are of a horse-shoe form, with pale centres. The warm fawn colour, so conspicuous in the under parts of the Australian bird, is absent in the New Zealand species, in which the ground colours are pale brown and white. The wash of grey in the plumage of the upper surface which distinguishes the former—especially in the young state—is absent from the latter. In the Australian bird the legs are yellow or straw-coloured; in the New Zealand species they are brown. On comparing the two birds there are other minor differences, very noticeable in their general effect but difficult to define or describe.

Three beautiful specimens of *Coturnix novæ-zealandiæ* from the late Sir William Jardine's collection—on its dispersal in 1886—found their way into the Natural History Museum of the Cambridge University, where there is also a good series of the eggs of this species. Of the latter there are several examples in the possession of Mr. Richard D. Thomas, of Christchurch, N.Z.

HEMIPHAGA NOVÆ-ZEALANDIÆ.

(NEW ZEALAND PIGEON.)

Carpophaga novæ-zealandiæ Latham; **Buller, Birds of New Zealand, vol. i., p. 229.**

"The most perfect figure of a beautiful bird that I ever saw in any work." That was Sir Richard Owen's published commentary on Mr. Keuleman's plate of this Pigeon in my last edition. The learned Professor was accustomed to say what he honestly believed; and I think in this instance the encomium was well merited. Some other Pigeons have more brilliant colours, but taking altogether into consideration its large size, its beautiful symmetry, and its handsome plumage the New Zealand bird is, I think, without its peer in the large group of fruit-eating Pigeons.

A young one that came into my possession is smaller than ordinary birds, with somewhat duller bronze plumage, and it has the white of the under parts largely mixed with delicate French-grey, especially on the sides of the body and under tail-coverts, the large feathers among the latter being entirely of that colour; abdomen and under tail-coverts creamy instead of white; lining of wings entirely French-grey.

It is very regrettable to see how scarce this fine Wood-pigeon is becoming in all the settled districts. Even as late as 1880 it was extremely abundant in the Forty-mile Bush. I find the following entry in my diary for April of that year:—The Pigeon is now feeding on koroi, the small red berry of the kahikatea, which is exceptionally abundant this year, the trees by the roadside as we passed through the Forty-mile Bush having a russet hue from the abundance of the ripe fruit. The miro berry comes in next month, and the whanake early in June. The pate (called "patete" by the Ngatikahungunu, and "kotete" by the Ngatiraukawa) is now in fruit, the long spikes or drupes of berries hanging in conspicuous clusters along the edge of the forest. This, too, is a favourite food of the Wood-pigeon at this season. The houhou, which has clusters of black berries, like the English elder-bush, contributes likewise to the bountiful bill of fare; so also does the karamu (*Coprosma lucida*), and a much larger kind, called 'Raurekau' by the natives, producing a brighter-red berry, and now in full bearing. The Tui and the Kaka also regale themselves at this season on these sweet berries.

The flight of the Wood-pigeon is rapid and direct at first, then oblique and somewhat tumbling; that is to say, the bird turns over first on one side, then on the other, in a very measured manner. The tail is partially spread during flight.

Many beautiful varieties of this fine Wood-pigeon have been recorded from time to time, but there is a specimen in the Colonial Museum of which no description has yet been published. In this bird the plumage of the head, neck, breast, and mantle is largely varied with pure white, which predominates on the neck, the normal bronzy plumage shining out in the midst of it, especially on the breast, with a very pretty effect; there are also a few scattered white feathers on the wings and tail. This handsome bird was obtained at Eketahuna, and presented to the Museum by Mr. R. R. Greville.

Two beautiful specimens were obtained some years ago by Mr. C. J. Robinson, of the Upper Hutt, and are now in my son's collection. One of these, shot by him on a miro tree at the summit of the western range, opposite Wallaceville, in June, 1892, has the head, neck, and breast, and the upper surface generally dull yellowish-brown, shaded with darker; the primaries and tail-feathers

clove-brown, the latter darker; the higher interscapular region or shoulders and the small wing-coverts rich vinous-brown; some of the outer coverts pale brown with vinous edgings; the whole of the under surface pure white. Bill and feet red. The other bird was shot in the same spot about eight days later. It is a lovely albino, the entire plumage being pure white, with just the faintest tinge of cream, or, so to speak, another shade of white on the breast; and on the smaller wing-coverts there is a pale wash of cream. The primaries and tail-feathers are pale cream with pure-white shafts. Bill and feet red.

A specimen which I afterwards received from Nelson has the white of the underparts, especially along the junction with the bronze plumage of the breast, washed with chrome yellow, and the under tail-coverts are entirely of that colour. It is apparently an adult bird, and is marked "female" by the collector.

A partial albino from Martin's Bay has the breast metallic-blue and green intermixed; upper part of breast and small upper wing-coverts rich vinous-brown; back pale bluish-green and grey; scapulars largely marked with white; upper surface of wings pale bluish-green and brown intermixed; quills margined and tipped with pale brown; tail-feathers brown, tipped with brownish white; under tail-coverts dark-cream colour.

In the Hawke's Bay Museum there is an almost perfect albino, the whole of the plumage being white, with the exception of a sprinkling of coppery-brown feathers on the head and upper-surface of wings. In the Wanganui Museum there is a peculiar example of partial albinism, already described by Mr. Drew. This bird looks just as if it had been sitting out in a fall of snow, the head, shoulders, and more-exposed portions of the back being perfectly white, and presenting a striking appearance.

A partial albino received from Wanganui has the head, neck, breast, and upper surface of wings and back dull yellowish-brown, with numerous yellowish-white feathers on the back and rump, and a few widely-scattered ones among the larger wing-coverts; all the smaller wing-coverts and the interscapulary feathers rich vinous-brown, with a perceptible sheen, forming a sort of mantle; wing-feathers and tail-feathers of the same yellowish-brown colour as the body plumage, with paler tips; bill and feet normal.

Another specimen (obtained from the woods near Levin) has the plumage entirely white, with only a tinge of cream colour on the upper surface of wings and on the hind-neck.

Two other examples are thus referred to by me in a communication to the Wellington Philosophical Society:—"To the many instances of albinism reported from time to time I have now to add two more. One of these is a pure albino, from the Wanganui district. The entire plumage in this bird is pure white, with just the faintest tinge of buff on the shoulders and upper wing-coverts. The other specimen is from Collingwood, and being only partially an albino, presents a very peculiar appearance. The entire plumage is pure white with the following exceptions: from the lower mandible, on each side, a broad patch of purplish black, with metallic reflections, passes under the eye, spreads over the ear-coverts, and extends downwards almost to the shoulder. On the inner flexure of each wing there is a patch of coppery brown; some of the wing-coverts are brownish grey, and the secondaries are almost wholly of that colour, the innermost ones more or less washed with coppery brown. One of the tail-feathers is of the normal colour, freckled towards the base with white, as are several of the upper tail-coverts; bill, eyelids, and feet bright arterial red."*

To the numerous eccentric varieties I have already recorded I must add another which is fortunately preserved in the Nelson Museum:—Head, neck and breast bronzy green, each feather with a broad purplish margin; shoulders, scapulars and upper wing-coverts ash white, each

* *Trans. N. Z. Inst.*, vol. xxviii., p. 347.

feather with a terminal spot of reddish brown, the surface presenting a decidedly spotted appearance; quills and tail-feathers ash grey, darker and with greenish metallic reflections on their outer vane and at the tip; croup or rump bronzy green; the upper tail-coverts ash grey with dark tips.

A specimen purchased by me from Mr. Jacobs, of Wellington, taxidermist, has the general plumage delicate cream-colour; under-surface pure white, the line of demarcation on the breast being quite distinct; nape, shoulders, interscapulars, and small wing-coverts rich chocolate-brown, forming a very conspicuous mantle; bill and feet carmine.

Lastly, just before leaving the Colony, in 1898, I received from the Waitara district, New Plymouth, a very handsome albino:—Head, neck, breast, back, wings and tail pale fawn colour; interscapular region, shoulders and smaller wing-coverts thickly marked with rich vinous brown; under-surface of body creamy white.

What traveller on the West Coast of the South Island has not heard of the "White Pigeon of Ross"? Its story is quite romantic. A settler named Ogilvie was out shooting in the woods, and saw a snow-white Pigeon, but to his great disappointment he could not get near enough for a shot. Night after night he dreamt of this wonderful Pigeon, and, a fortnight later, he was out shooting again for the pot. He was just in the act of pulling the trigger on a sitting Pigeon when the snow-white bird moved into position alongside, and the billing and cooing mates came down together at one shot. He had the albino stuffed and mounted in a glass case. For several years it has been a centre of attraction at the Half-way Accommodation House, till at length the expression, "Come and see the White Pigeon," has become the equivalent among the diggers, at Ross, of "Come and have a drink." I remember hearing Lord Onslow tell his own experience of this. He was driving through the district, with the Premier of the Colony in attendance, when the coach pulled up at the Half-way House. His Excellency was invited to come in and see the bird, but declined. On reappearing the Premier remarked, "Well, I have seen the White Pigeon," to which the Governor promptly responded, "And what did it *taste* like, Mr. Seddon?"

It is certainly a very beautiful object, the whole of the plumage being pure white, stained with light fawn on the shoulders and upper wing-coverts. This "White Pigeon" is such an unfailing source of revenue that I tried in vain to induce the landlady to name a price for it. Someone, she said, had offered her ten pounds, but she had only "laughed at the idea" of selling it.

Only a few miles south of this place another albino was shot some time later, and this is now in the possession of Mr. Bruce, of Ross. This is a less handsome bird, being creamy white with a deep tinge of fawn on the shoulders and wings.

A Maori at Otaki had a tame bird of this species in his possession for some months. It had the freedom of a large hut, where I saw it, and would perch on the hand or shoulder in the most confiding manner. In the end it was killed by one of those mongrel curs that infest every native village. I also had one confined in an aviary for some months, intending to forward it to the Zoological Society of London; but, unfortunately, some children, taking compassion on the bird's solitary appearance, deliberately opened the door and turned it loose. This Pigeon had been brought in by a party of bush-fellers, who reported that it was stunned by becoming entangled in the branches of a falling tree. It seemed quite unhurt, and adapted itself readily to captivity, feeding freely on wheat, cooked potato, and almost anything offered to it. It consorted with a tame Silver-runt, confined with it. The latter laid two eggs, but they proved to be infertile.

The protection extended to this bird by the Legislature, in having every sixth year made a close season, is a great boon, and will save this fine Wood-pigeon from the extermination which at

one time threatened it. The fact of a species being very plentiful is no guarantee against its speedy extinction when once the tide of destruction has set in. Of this it would be easy to adduce numberless proofs from all parts of the world. But protection at the right moment may achieve a good deal in the way of arresting the evil. An intelligent old man of the Ngati-wehiwehi Tribe said to me one day in February: "The Pigeons are coming back to us. Soon they will be as plentiful as ever. [As we spoke five of them passed in sight, each winging its solitary flight.] Now they are good eating. In January they have the early miro. This lasts through February. Then they get very fat and sweet. In March the food is scarce. In April the second crop comes on, and then the birds get fat again." Tamihana Whareakaka, who was present, chimed in: "Oh, yes; how fat the Pigeons were in the old days, when we used to go out and trap hundreds of them! Kakas, too, were plentiful. These are disappearing, because the introduced bees have taken possession of the hollow trees. That can't be helped," added he; "but what is the use of the Government protecting the other birds, and imposing fines and punishments, if they allow all the woods to be destroyed; for how is the Pigeon to find subsistence when the berries are gone?" There is some philosophy in Tamihana's words, but I fear it is a poor argument against the requirements of advancing settlement. The only thing to be done is to insist on ample bush reserves being set apart.

Mr. Elsdon Best, in his interesting notes on "Forest Lore," published in the *Lyttelton Times*, gives the following account of the Maori method of snaring and killing the Pigeon:—

> The Kereru, or Pigeon, was taken by the spear, noose snares (mahanga or tahei) and tutu. The long bird-spear (tao-kaihua) was used to spear them during the period of the Rarangi-tahi (January), when the birds were very fat. During the Rarangi-tahi the birds are assembled on the hill-growing rata, and are busy extracting the honey (wai-kaihua) from the rata blossom (kahika). Snares for this bird were either placed on the trees or set around a waka or waituhi. The waka-kereru is a wooden trough about four feet long. It is either fixed up on posts set up at the feeding grounds or secured to the branches of a tree, and sometimes, in the case of a leaning tree, such as the rata, it is secured to the sloping trunk of such tree. It is then filled with water. The birds become thirsty when feeding, especially when on the toromiro, and soon discover the supply of water placed so conveniently for them. When the Pigeons have become accustomed to drinking from this trough, the same is set with snares. The takeke, or cord to which the noose snares are attached, is stretched along both sides of the trough and about eight inches above it, being secured and kept in position by the teka-teka and arorangi. To the takeke are attached the snares, right along both sides of the trough. When a Pigeon alights upon the edge of the trough it thrusts its head through one of the snares (which are set closely) in order to reach the water, and is thus caught. Should there be a spring of water near the feeding grounds, it is set round with snares in the same manner. In the case of a small stream, the water is covered over with branches or fronds of the various ferns, leaving a few open spaces of water, which are set with snares. 'Waituhi' is a term applied to pools of water which collect in natural hollows of trees and rocks. When frequented by Pigeons they also are surrounded by snares. The term 'ngongo' is sometimes applied to such a pool, but neither terms are used to denote the waka or trough.
>
> In the old pre-pakeha days the long bird-spears were highly prized, as their manufacture involved an immense amount of labour, having to be hewn out of a solid tree-trunk by means of stone implements. A spear of 30 or 35 feet in length and 1 inch in thickness was made in one piece. They were carefully preserved and handed down for generations. Also they were usually named by the owners; thus two famous tao belonging to the Ngati-kuri are called 'Owha' and 'Koamai-tupeka.' They are now suspended from a famous tutu-tree at Rahiti-roa, on the trail to Maungapohatu.
>
> The snares for Pigeons and Koko were also set on tree tops, that is, on the ends of the branches, and where birds would collect while feeding. Great numbers of snares would be arranged on a tree much frequented by birds, such as 'Heipipi,' a famous white pine near Te Wera-iti, and 'Ranina,' a matai at Mangakakao, (the rakau tahei koko). To arrange these sets of snares the term 'tahei' is used, the same being both verb and substantive. To form the loops is 'whapiko mahanga' or 'kopiko mahanga.' Thus 'mahanga' means a single snare, but 'tahei' the grouping of those snares in numbers. The 'tarahanga' is also a form of snare used for taking Pigeons.

To hear Pigeons calling in the night is a 'tatai mate,' an evil omen. The classical or mythological name of a Pigeon is 'Rupe.' This was the other name of Maui-mua, a famous Polynesian demi-god, who transformed himself into a Pigeon.

Pigeons were also taken by the mutu, which is like unto a small mutu-kaka, and was used in a similar manner.

In the tahei method of snaring, when a great number of pigeons were found caught in the snares, the fowler would remark, 'Me te rau rangiora'—like white leaves of the rangiora—alluding to the white plumage of the birds. Or, if many koko were found ensnared, he would then say, 'Me te rapa-rapa tuna'—like eels hanging from the spits.

In a letter to myself from Ruatahuna, this same writer says: "An albino Pigeon was killed here lately. It was not pure white, except on the under-parts, but it was of a pink colour, and very pretty. I regret that the bird was too much knocked about to be worth accepting."

Mr. Dall, who is a very intelligent observer, wrote to me from Collingwood, saying that a Wood-pigeon, apparently a male, had established itself with a flock of tame pigeons. "It rests on the neighbouring trees, but comes down to feed with the Blue-rocks, consorts with them, and seems disposed to mate with one of them."

Mr. George Fraser, native-born and a good observer, says he is satisfied that our Wood-pigeon breeds twice in the season. He has found no less than seven nests of this species at different times—all flimsy structures—with the eggs showing through them from below.

Some writers still insist on treating *Hemiphaga spadicea* as a New Zealand bird. Although included in Mr. G. R. Gray's "List" of 1862, there is no evidence that this bird was ever found in that country. It formerly inhabited Norfolk Island and Lord Howe Island, but was long ago extirpated. Mr. Cheeseman says that the earlier settlers on Sunday Island (Kermadec group) found a large fruit-pigeon very abundant on their first arrival; but its numbers were gradually thinned, and it was finally exterminated, partly by the settlers themselves and partly by the cats introduced by them which had run wild. They describe it as being greatly similar to the New Zealand species and, as the identity holds good as to all the other land birds now existing there, this may, I think, be accepted as a fact.

Mr. T. W. Kirk describes in the 'Ibis' (1898, p. 297) an abnormal specimen shot at Kaikoura in June, 1887, and presented to the Colonial Museum by Mr. H. Inglis:—

Head, neck and breast normal colour, but of a duller shade. Hind neck and front portion of scapulars and wing-coverts rich brown, profusely interspersed with white; hind portions of scapulars and wing-coverts white, the feathers in some places tinged and edged with slaty-grey; shafts of feathers deep brown, almost black; wings slaty-grey, much bestrewn with white, the feathers in most instances edged with coppery green, shafts normal colour; rump white, but with bluish-grey feathers profusely intermixed; tail-feathers white, but margined all round with bluish-black, shafts black; beneath, these feathers are white, but so thickly spotted with brown as to appear of that colour; the two outer shafts nearly white; abdomen and lower tail-coverts white; sides and lining of wings silvery grey, in places almost white; bill and feet normal colour.

HEMIPHAGA CHATHAMENSIS.

(CHATHAM-ISLAND PIGEON.)

Carpophaga chathamensis, Rothschild, P.Z.S., 1891, p. 312, Plate xxvii.
Carpophaga chathamica, Forbes, Nature, xlvi, p. 253 (1892).

The exhibition at a meeting of the Zoological Society of London of a series of specimens of the Wood-pigeon from the Chatham Islands, characterized as a new species, under the above name, shows how important it is to collect and examine even the apparently most common species. We had always known that the Wood-pigeon existed at the Chathams, but till these specimens were received in England, no one ever suspected that it was a different species from that inhabiting New Zealand. Mr. Henry Travers made a large collection of birds there, but he appears to have avoided this bird as being too common, and so the new species was missed by him altogether. The Maoris, who are only practical ornithologists, do not seem to have detected any difference between this bird and the 'Kereru' of their old home. As far back at 1855, when visiting those islands on Government business, I saw some wild Wood-pigeons consorting with tame Blue Rock Pigeons introduced by the settlers; but on the wing they were quite undistinguishable from our New Zealand bird, and I did not attempt to shoot any.

Confessedly fine as the New Zealand Wood-pigeon is, this species exceeds it both in size and comeliness, although, as a rule, its plumage is not quite so brilliant. There is a mounted specimen in the British Museum Gallery which shows it off to perfection.

It is one-fifth larger than *Hemiphaga nove-zealandiæ* and is "purple and pearl-grey where the latter is green and bronze-red."

Dr. Forbes, who recognised the bird as distinct about the same time as Mr. Rothschild, writes: "This Pigeon is now becoming scarce, and at present is most abundant on the south coast, where it loves to play in the strong up-current that towers into the air, rebounding from the perpendicular face of the cliffs when a strong sea-breeze is blowing; and on the north coast, on the estate of Mr. Chudleigh, who does all he can to protect the native birds, by prohibiting their being shot on his property."

At page 40 I have quoted Mr. Dall's account of the New Zealand Pigeon consorting with tame ones. The same thing has been remarked of the English Wood-pigeon. Thus the *Daily Telegraph* of October 1st, 1899, had the following paragraph:—"Has the Wood-pigeon, which has invaded London in considerable numbers during the past season, come to stay? Two specimens of this bird have for the past day or two been noticed, in the neighbourhood of Westminster Abbey, pecking in company with kindred columbarians of the tame breed, apparently in perfect amity. Possibly the strangers have been hatched this year in the metropolitan area, and thus have been acclimatised to the bustle of traffic. Anyhow, although the Wood-pigeon is naturally shy, the pair alluded to seem to be as tame as the town birds."

On his last visit to the Islands, the late Mr. Hawkins wrote to me: "The Pigeon on the Chatham Islands is nearly extinct. I have been out every day for two weeks and only got four, and one of those was spoilt in the shooting."

HYPOTÆNIDIA MUELLERI.

(AUCKLAND-ISLAND RAIL.)

Rallus muelleri, Rothschild, Bull. Brit. Orn. Club, No. viii., pl. xl. (April, 1893.)

Rallus brachypus (*nec* Swains.), **Buller, Birds of New Zealand, ii., p. 100.**

Hypotænidia muelleri, Sharpe, Handl. B., i., p. 96.

A well-preserved example of this presumably extinct Rail is in the Stuttgardt Museum, and has been thus characterised by Mr. Walter Rothschild :—

"*Adult.*—Upper surface of head, occiput, and neck brownish-red, faintly and irregularly striated with black; back and rump bright chestnut, with the centres of the feathers black; wings brownish-black, faintly edged with rufous-grey; cheeks reddish-grey; centre of the throat reddish-white; lower part of throat and breast rufous-grey; flanks, abdomen, and under tail-coverts black, each feather tipped with pale rufous, and with two white bands; tail rufous, with indistinct grey bands. Wing 3·3 in., culmen 1·1 in., tarsus 1·1 in., central toe with claw 1·3 in., tail 1·3 in."

The specimen was sent for description by Count von Berlepsch, and it was named in honour of the famous botanist, the late Baron von Mueller, K.C.M.G., of Melbourne, from whom the Museum received it.

Dr. Sharpe says of it, in the 'Catalogue of Birds, B. M.' (vol. xxiii., p. 330) :—"It is an island-form of *H. brachypus*, with the wing-coverts elongated and the feathers of the lower back and rump much puffed out, as in the flightless Weka Rails (*Ocydromus* and *Eulabeornis*). Its tawny colour distinguishes it at once from *H. brachypus*."

In 1875, Baron A. von Hügel recorded, under the name of *Rallus brachypus* (*Ibis*, 1875, p. 392) a Rail from the Auckland Islands, killed in that locality by the unfortunate Captain Musgrave, of the 'Grafton.' There is no doubt in my mind that this is the same species as the one mentioned above. Baron von Hügel says: "On comparing the Auckland with the Australian bird I found them to agree very closely, though the colouring seemed different." He adds that "it is the first Rail known to have been procured in the group."

In Mr. Rothschild's opinion, however, this bird most resembles *Rallus lewini* of Australia, the chief distinguishing feature being the "enormous development" of the feathers on the back and rump.

HYPOTÆNIDIA PHILIPPENSIS.

(BANDED RAIL.)

Rallus philippensis, Linn.; **Buller, Birds of New Zealand, vol. ii., p. 95.**

At the end of February I found a party of three young birds in a crop of dry oats at Papaitonga. I placed them in an aviary, where they partook readily of boiled potato, but remained very shy, always keeping under cover during the day and coming out only after dark.

I have received a specimen from Stephen's Island. Mr. Lyall, who sent it, writes: "I am sending you a Rail, now very scarce. Saddlebacks are not very plentiful. Thrushes are fairly numerous, but in a short time there will not be many left, as the cats have become wild and are making sad havoc among all the birds."

During my last visit to Fiji, when out shooting on the Island of Wakaya, I heard the unmistakable note of this species. I also received two skins from one of the other islands of the group. They differ from the typical form in the more spotted character of the wings and in the total absence of the chestnut-coloured pectoral band.*

This species is said to have been introduced into Lord Howe's Island; but there is no positive evidence of this.

Professor Hutton considered the Macquarie Island bird—of which there is a single specimen in the Otago Museum—distinct and named it (*Ibis*, 1879, p. 454) *Rallus macquariensis*. I have given my reasons (vol. ii., p. 95) for treating it as only a local (and perhaps immature) example of *R. philippensis*; and Professor Newton, in a letter to me (30th January, 1902) says: "I am quite prepared to accept your determination of *Rallus macquariensis* being specifically identical with *R. philippensis*—a bird which goes wandering about in the most extraordinary way, and might well find its way to those islands. One was brought to my brother Edward, at Mauritius, having been picked up on the race-course there. If it met with a mate and bred, the progeny would very likely diverge somewhat from the original stock—that is only what might be expected; but the process would take some little time and the fact would be interesting. The British Museum has two specimens, which I daresay you have seen, sent by Sir G. Grey to Sclater some twenty years ago or more."

In a small tank of birds, in formalin, sent to me from the Island of Nuiafoou in the Tonga group, I was advised of a "Veka" (the name seeming to be the equivalent of the Maori "Weka") being among them. Hoping to discover a new Woodhen from this remote island, I anxiously awaited the arrival of this consignment, when I found to my disappointment that the bird was only this common form, but (like my specimens from the Fiji Islands) entirely lacking the pectoral band of chestnut.

* Lord Walden writes, ('Orn. Works,' p. 194):—"The Celebean bird has the nape rusty as in Australian individuals. In the event of the Philippine species proving distinct, the birds from the other localities above given will require a different title. Messrs. Finsch and Hartlaub have adopted Cuvier's title of *pectoralis* copied by Lesson (Tr., p. 536) for this species, although Dr. Pucheran had shown that the type of *R. pectoralis*, Cuv., was *R. lewini*, Swains. (*conf.* Hartl. J. für Orn., 1855, p. 420)." (And, again, at p. 527): "In two specimens from Monte Alban (Luzon) the pectoral band is just indicated by the tips of some of the feathers being tinged with pale rusty fulvous. In the third the white bands are coloured with rusty fulvous, but the black bands show through. In the example which has the pectoral band least developed the nape is most rufous, and this is the case in a Celebean individual without a trace of pectoral band, the nape being pure bright rufous."

NESOLIMNAS DIEFFENBACHI.

(DIEFFENBACH'S RAIL.)

Cabalus dieffenbachii, Gray; **Buller, Birds of New Zealand, vol. ii., p. 121.**

Confined to the Chatham Islands and long since extinct. The only known specimen is in the British Museum.*

In his paper 'On the Extinct Birds of the Chatham Islands' (Nov. Zool., vol. iii., p. 73) Dr. C. N. Andrews says: "Milne-Edwards has shown that *Aphanapteryx* is likewise an Ocydromine Rail which has undergone a similar series of modifications, and its similarity to *Diaphorapteryx* is so remarkably great that Forbes was justified in his hesitation in according the Chatham Island bird generic rank; but the inferences he draws from the simililarity of the two forms do not appear well founded. He considers that their occurrence in Mauritius and the Chatham Islands is strong evidence that these were formerly connected with the great Antarctic Continent, for the existence of which a large body of evidence has been brought forward by various writers. It is true that the geological structure of the Chatham Islands tends to show that they form part of a continental area, since they are largely formed of sedimentary deposits consisting of clay-slates, limestones, and various fossiliferous tertiary deposits, which, according to Hutton, probably range from the Upper Eocene to the Upper Miocene; but, on the other hand, there is nothing in their present fauna to show that since their last emergence they have been connected with any land area whatever. On the contrary, it seems clear that since that period they have never been united even with New Zealand, for not a trace of any of the *Dinornithidæ*, *Apteryx*, *Cnemiornis*, *Aptornis*, or any of the flightless birds characteristic of those islands, have been found in them. Moreover, as Mr. Forbes himself has pointed out, no fragment of the skeletons of *Diaphorapteryx* is recorded from New Zealand. This complete difference in the flightless birds of the two areas does not seem to be outweighed by the occurrence of *Hatteria*. . . . Dr. Gadow has, I think, given the true explanation of the likeness of *Diaphorapteryx* and *Aphanapteryx* to one another, namely, that it is the result of parallelism of evolution, or in other words, similar conditions acting on similar organisms have produced like results. The ancestors in the two cases, generalised Rails capable of flight, were probably of different genera, or, at least, species. In the case of *Diaphorapteryx* this ancestor was most likely some widely spread form, such as *Hypotænidia philippensis* is at the present day, individuals of which from time to time reached New Zealand, Lord Howe Island, and the Chatham Islands, the channels between which may formerly have been narrower than at present. The modified descendants of these birds are now referred to the genera *Diaphorapteryx*, *Cabalus*, and *Ocydromus*, the most highly modified forms being the outcome of earlier—the less altered, of later—colonisations. In any case, there can be but little doubt that these Rails became flightless in the islands they now inhabit, and cannot therefore be regarded as evidence of the former extension of land; in other words, they are of no value in determining former geographical conditions, since they are themselves the outcome of the present one."

* Another Ocydromine form, of much larger size, once inhabited the Chatham Islands, the fossil remains of which were first discovered by Dr. A. O. Forbes, with the assistance of a local collector, Mr. Hawkins, after whom he named it *Diaphorapteryx hawkinsi*.

HUTTON'S RAIL.

~~GABAL~~US MODESTUS.

(FOUR-FIFTHS NATURAL SIZE.)

CABALUS MODESTUS.

(HUTTON'S RAIL.)

Cabalus modestus, Hutton; **Buller, Birds of New Zealand, vol. ii., p. 123.**

THERE seems little doubt that this remarkable form has, like its larger congener of the Chatham Islands, *Cabalus dieffenbachi*, become extinct. The small island of Mangare, on which it was originally discovered, and whence fortunately a good many specimens have been obtained for the various museums, is now overrun with cats, besides which the native vegetation has been burnt off for the purpose of sowing grass-seed, even this bleak spot having been annexed by the enterprising sheep-farmer.

The occurrence of these flightless forms of bird-life in detached insular areas is a most interesting and suggestive fact in the zoology of this region, as I have more than once pointed out, and it is of the utmost scientific importance that we should obtain full information as to the structure and anatomy of these peculiar endemic species before they pass away for ever.

Of this interesting Rail I have in my collection three specimens, all obtained by the late Mr. Hawkins. There are three in the British Museum; also a pair in the Liverpool Museum, a single specimen at Cambridge, and a matchless series in Mr. Rothschild's Museum at Tring.

Mr. Hawkins informed me that this bird is strictly nocturnal in its habits, and that the man employed by him was out every night for two months before he succeeded in taking the specimens now in my collection.

The distinguishing superficial characters of this remarkable form are apparent at a glance: the abbreviated wings, the soft fluffy plumage of sombre hue, the long, slightly-curved bill, and the well-developed legs. Professor Hutton, who first described this species, claimed for it generic rank on account of its internal structure (Trans. N.Z. Inst., vol. vi., pp. 108-110), and this claim is now generally recognised. The curvature of the bill is more pronounced in the larger (presumably the male) bird, being very similar to that of the Moeriki (*Cabalus dieffenbachi*) as figured in the 'Transactions' of the New Zealand Institute (vol. vi., p. 12), but more slender, and I feel confirmed in the opinion that the two species are referable to one and the same genus, although, for the sake of consistency, I now follow Dr. Sharpe in referring the latter to the genus *Nesolimnas*.

The specimens I now possess have enabled me to prepare a more detailed description of the species than has hitherto appeared.

Adult.—General plumage dark vinous-brown, changing to dull grey on the throat; foreneck, breast, and the rest of the under parts, as well as the sides of the body, marked with numerous narrow, transverse, broken bars of yellowish-brown; these markings continued, but in a fragmentary and scattered manner, on the upper surface of wings; on the bastard quills, and on the under tail-coverts they are broader, lighter, and more regular; quills blackish brown, each vane crossed at regular intervals by triangular markings of fulvous-brown. Bill and feet uniform dark-brown.

The two first specimens obtained differ appreciably in size, and I take the smaller of the

two to be the female, although the wing-markings are more conspicuous than in the larger one. In this latter the curve in the bill is very apparent.

Male.—Extreme length, 9 in.; wing, from flexure, 3·2 in.; tail, 1·6 in.; bill, along the ridge, 1·5 in., along the edge of lower mandible, 1·7 in.; tarsus, 1·2 in.; middle toe and claw, 1·5 in.

Female.—Extreme length, 7·5 in.; wing, from flexure, 3 in.; tail, 1·5 in.; bill, along the ridge, 1·25 in., along the edge of lower mandible, 1·6 in.; tarsus, 1 in.; middle toe and claw 1·4 in.

In both examples there is a minute spur at the flexure of each wing.

Mr. Hawkins writes: "The young ones are always of the same colour as the old. They nest in holes in the ground, and when the young are hatched they get into fallen hollow trees. They live on insects, principally the sand-hoppers (*Crustacea amphipoda*), which travel into the bush here a long way. There is no sand at all on the island (Mangere) where the birds are."

Dr. Forbes, who was fortunate enough to secure a specimen of the egg (the only one as yet discovered) states that it is nearly white, measuring 1·45 in. in length by 1·1 in. in diameter, and indicating its Ralline character by a faint double spotting of grey and rufous.

The flightless Waterhen of Tristan d'Acunha (*Gallinula nesiotis*) was discovered by Sir George Grey in a very peculiar way, as already recorded by me (vol. ii., p. 104). In forwarding a living example of it to the Zoological Gardens, Sir George reported that "it can flutter a little, but obviously uses its wings and not its legs as a means of escape." On examining this form, Dr. Sclater, who named and described the species, found that the wings, sternum, and coracoids are all reduced in length, and the crest of the sternum in depth, in comparison with the same bones in the European Waterhen (*G. chloropus*), whilst, on the other hand, the thigh-bones and pelvis are increased in length, the former by four lines, relatively to the same bones in the common Waterhen. "Hence," as Mr. Darwin remarks, "in the skeleton of the natural species nearly the same changes have occurred, only carried a little further, as with our domestic ducks, and in the latter case I presume no one will dispute that they have resulted from the lessened use of the wings and the increased use of the legs."

GALLINULA NESIOTIS: BY KEULEMANS.

OCYDROMUS GREYI.

(NORTH-ISLAND WOOD-HEN.)

Ocydromus greyi, Buller, Birds of New Zealand, vol. ii., p. 105.

This species of Wood-hen is still numerous on the wooded hill-sides and mountain gullies in the Murimotu-Taupo district. It is seldom met with in the open country, except at one particular season, when the birds are exceedingly fat, and the natives catch large numbers by running them down with dogs.

It is a very remarkable fact in local botany that on the arid lands forming the Onetapu Desert, and on the slopes of Ruapehu Mountain, where the climate is very rigorous, certain native pines, which in the lowlands attain to a considerable height as forest trees, are represented by dwarfed forms of the same species, not more than a few inches in height, and often assuming a creeping habit. These degraded forms, which are specifically identical with their forest relations, resemble them exactly in their fructification. The berries borne by these pigmy growths equal in size, and sometimes even exceed, those of the forest trees—the fruit of the dwarf totara, for example, being sometimes double the size of the normal berry, while those of the miro, kahikatea, and rimu are at least fully equal to the berries produced by the forest trees. When these miniature woods are laden with ripe mast the Wood-hen leaves the shelter of the woods and comes out into the open to revel in plenty. As already stated, the birds then become unusually fat and, owing to their diminished activity, become an easy prey to the natives. Captain Mair informs me that he has known of a native with a good dog, fifteen years ago, killing as many as eighty in a single day. Pigeons and Kakas, also, are said to resort to these sub-alpine woods in considerable numbers to feed on the ripe fruit. When camped on the edge of a red-birch forest near the Mangataramea Stream (at an elevation of 3,000 feet) I heard the loud cry of the Wood-hen every night, but I never met with the bird in the open country, and the sheep-farmer with whom I was staying appeared never to have seen one.

I was much struck with the beauty of these clumps of bush in the Murimotu highlands, where the Wood-hen was so numerous. Some of them consist entirely of kawaka (*Librocedrus doniana*), a very ornamental tree of bright-green foliage and tapering growth, with a trunk like a miniature *Sequoia*. This is plainly seen when a fire has passed through the forest and left the trees dead and naked. In some places you meet with the strange sight of the whole forest apparently hewn down, and strewing the ground with bleached and charred trunks. The explanation is this: that these trees are generally hollow near the ground, and have only a feeble support of lateral roots. Consequently, when a fire has passed through and killed the trees, the dead timber cannot long resist the action of the weather, and one after another the "cedars" topple over with the passing blast, till at length not a single trunk remains standing, and an appearance is presented of utter wreck and desolation. For the most part, the trees are of small size, but Captain Mair informs me he has often met with them four feet in diameter at the base. Another tree that adds to the novelty of these subalpine woods is the silver-birch—a graceful and elegant tree of bright foliage, resembling at a short distance the larch, and showing up conspicuously amongst the black- and red-birch with which it mingles. In these mountain solitudes, however, there is very little animal life to engage the attention of the naturalist. On the summit of Gentle Annie, in fine weather, I met with what appeared to be a smaller and very bright variety of the

Yellow Admiral butterfly, but I could not catch any. I saw occasionally a small lizard, which I referred to *Lygosoma moco*. Bird life is scarce, except at certain seasons and in particular localities.

From some parts of the country this once very common species—whose cry, by the way, exactly resembles that of the European Curlew—is fast disappearing. In districts where, only a few years ago, it was extremely plentiful, its shrill cry is now seldom or never heard.

As a rule the colours of the female are much duller than in the other sex. But a specimen caught for me by a Maori dog at Papaitonga, and which proved on dissection to be a female, was as bright-plumaged a bird as I have ever seen. The ovary contained a cluster of undeveloped eggs. The bird was extremely fat and the skin unusually tough, indicating, I suppose, a ripe old age.

On a recent visit to Hawke's Bay I saw a lovely albino obtained in the Mohaka district. The whole of the plumage was snow-white, with the exception of a small patch beween the shoulders, the rump, and the upper tail-coverts, which were of the normal colour; bill and feet pale reddish-brown.

Mr. Elsdon Best writes: "The Weka, or Wood-hen, is almost an unknown quantity in Tuhoeland. I have only once heard the cry of this bird during a three-years' sojourn in the district. The natives, however, state that it was more numerous in former times. They were usually hunted with dogs."

A specimen which I received from the Hutt valley had the quills of the wings entirely black without any of the customary chestnut bars. On some of the secondaries there were obsolete markings, but very obscure and broken.

Mr. Pycroft says this species is still plentiful at the Bay of Islands, especially in the neighbourhood of Russell.

To the numerous recorded instances of albinism in New Zealand birds I have now to add another. A specimen of the above species from Hawke's Bay presents a singular piebald character: the forehead, fore part of crown, sides of head, throat, fore-neck, and all the underparts, are pure white; the normal colour appearing in a small patch in the middle of the breast, behind the thighs, and under the tail. The plumage of the upper parts is normal, save that on the left side of the head the white extends half round the nape. In both wings some of the secondaries and primaries and a few of the large coverts are pure white, and there is likewise one white tail-feather. Bill whitish horn-colour. Legs pale brown; claws yellow horn-colour.

I received on the 6th January from Captain Mair two newly-hatched chicks of this species, obtained on the banks of the Manawatu River. They were thickly covered with silky down of a uniform brownish-black colour.

At Owhaoko, in the Patea country, I found the Wood-hen fattening on the fallen fruit of the native Fuchsia (*F. excortica*). In this district this tree forms a principal part of the underwood, and assumes large proportions, the trunk being sometimes as much as two feet in thickness. The foliage is very conspicuous, being of a bright green colour, the under surface of the leaves being silvery white. This is the only really deciduous tree we have. The bark, which peels off in thin layers, is of a bright saffron-brown. The outer skin is extremely thin, and on the slightest abrasion discloses an inner bark of a vivid green colour. The karamu (*Coprosma lucida*), with its glossy green foliage, and bunches of red currant-like berries, is also plentiful here. And on the fallen fruit of these two trees the Wood-hen regales itself and gets fat.

Mr. Robert A. Wilson, to whom I am indebted for some beautiful specimens of this bird, writes to me: "Unlike the stupid Stilt-plover, the Wood-hen, which also lives in the bottoms of creeks, nearly always nests in a single raised flax-bush some distance above the flood-mark. When looking for eggs, if you walk along a creek and examine the bushes standing by themselves,

higher than the rest, you will sometimes find nearly every suitable one occupied. On our run about one pair of Wood-hens occupy about 300 to 400 yards of creek-bed, and you never find more than one pair in a section. Our creeks are all covered at the bottom with thick flax, and the Maoris have specially trained dogs to catch them in these localities. The man rides along the creek, while the dog trots along unconcernedly in the midst of the flax. When he arrives opposite a Wood-hen's home he stops and dashes in, then he as suddenly rushes out and runs ahead of the Wood-hen, which has, of course, started up the creek; then he turns and meets the bird, of which he makes a short business. A dog that did not understand his work would lose much time—first in searching the ground, and then in chasing the bird along the creek bottom, where it could travel faster than its pursuer. The Wood-hen is a very early breeder—commencing its nesting operations often in July."

When communicating this to the Wellington Philosophical Society, I wrote: "This note is interesting in itself, and, moreover, shows that this species is still plentiful in the Rangitikei district, at any rate. I have always known the male birds to fight vigorously for their rights; but in Mr. Wilson's district they appear to have a recognised territorial partition. Birds that are developing so much intelligence surely deserve a better fate than to be collected by a naturalist or consigned to the Maori pot! But the Wood-hen fights on very unequal terms with its new enemies—stoats and weasels. That the introduced carnivora continue to do untold mischief is beyond question. In the *New Zealand Herald* I find the following paragraph on this subject: 'Scarcely a day passes but what we hear some news of the depredations by weasels in one part or other of the district. Several deaths among sheep have been reported in the Hautapu district lately, and on Thursday last Mr. Ward lost three fine ewes. The deaths in all cases were attributed to weasels.'* "

Mr. D. G. Polson, of Mangawhero, Fordell, sends me the following interesting note: "I have read your very instructive article 'On the Ornithology of New Zealand' with very great interest

"* My own views as to the absolute wickedness of introducing these predatory animals into our fair land are too well known to need repetition. But I should like to quote here what Professor Newton has to say on the subject: 'In respect of extermination leading immediately to extinction, the present condition of the New Zealand fauna is one that must grieve to the utmost every ornithologist who cares for more than the stuffed skin of a bird on a shelf. In the fauna of that region the class Aves holds the highest rank, and, though its mightiest members had passed away before the settlement of white men, what was left of its avifauna had features of interest unsurpassed by any others. It was, indeed, long before these features were appreciated, and then by but few ornithologists, yet no sooner was their value recognised than it was found that nearly all of their possessors were rapidly expiring, and the destruction of the original avifauna of this important colony, so thriving and so intellectual, is being attended by circumstances of extraordinary atrocity. . . . Allowing for a considerable amount of exaggeration on the part of the sheep-owners, no one can doubt that the rabbit plague has inflicted a serious loss on the colony. Yet a remedy may be worse than a disease, and the so-called remedy applied in this case has been of a kind that every true naturalist knew to be most foolish—namely, the importation from England and elsewhere and liberation of divers carnivorous mammals—polecats or ferrets, stoats, and weasels. Two wrongs do not make a right, even at the antipodes, and from the most authentic reports it seems, as any zoologist of common-sense would have expected, that the bloodthirsty beasts make no greater impression upon the stock of rabbits in New Zealand than they do in the mother-country, while they find an easy prey in the heedless and harmless members of the aboriginal fauna, many of whom are incapable of flight, so that their days are assuredly numbered. Were these indigenous forms of an ordinary kind their extirpation might be regarded with some degree of indifference; but, unfortunately, many of them are extraordinary forms—the relics of perhaps the oldest fauna now living. Opportunities for learning the lesson they teach have been but scant, and they are vanishing before our eyes ere that lesson can be learnt. Assuredly the scientific naturalist of another generation, especially if he be of New Zealand birth, will brand with infamy the short-sighted folly, begotten of greed, which will have deprived him of interpreting some of the great secrets of nature, while utterly failing to put an end to the nuisance—admittedly a great one. The provoking part of the thing is that, as shown by Mr. Sclater ('Nature,' xxxix., p. 493), there exists a way, the discovery of Mr. Rodier, at once simple, natural, and efficacious, of reducing the rabbit-pest.' ('Dictionary of Birds,' pp. 224-225.)"

and was much struck by your statements in regard to the disappearance and reappearance of certain birds near your property in the Horowhenua district—particularly the Weka. I have always thought it strange that this bird should be very scarce near where I now live. There was in this place—when I knew it first—abundance of cover and feed and that mixture of light bush and open patches such as the Weka loves in other parts of the country, but, so far as I know, the bird has always been a stranger, while along the No. 2 line, near Wanganui, it is comparatively plentiful."

Mr. Hamilton records that he once found a nest containing (November 10th) four eggs, whilst the female bird, which was caught on the nest, contained another egg fully developed.

As is well known, there has been much discussion in the Colony as to the alleged existence of hybrids between the Weka and the domestic fowl. In order to determine this question I brought to England, for anatomical examination, a specimen received from Dr. Lewis, the then Medical Superintendent at Rotorua, as a typical example of the alleged hybridity, and placed it in the hands of Dr. James Murie, the well-known expert. That gentleman made the necessary examination and published a very elaborate report, accompanied by numerous beautiful illustrations, in the 'Transactions' of the New Zealand Institute (vol. xxii., 1889). The result was to shatter, once and for all, the theory of hybridity. From that report, all that I consider necessary now is to extract a few passages :—

I received from Sir Walter Buller a square tin canister, soldered down and air-tight, containing the bird preserved in strong spirit. I found the specimen in good condition for anatomical examination, though not perfect in plumage. The plumes of the primary and secondary wing-feathers and those of the tail-feathers (*rectrices*) had been broken away, but leaving sufficient of the quills intact to enable their numbers to be counted.

The bird was an adult of stout build, muscular, though in very lean condition. It outwardly resembled an ordinary cock of good size, inasmuch as there was a fair development of comb and wattles; nevertheless, partly from its unusual plumage and otherwise, there was something not easily defined, suggestive of its being a fowl of impure breed.

As taken out of the preservative fluid, before drying, the ear-coverts were of a dark brownish-black, browny-black, or sooty-brown, as, indeed, were such feathers of the body and of the tail as were left; the tint varying in different degrees of intensity. When dried, however, the feathers assumed quite a bluish-grey hue, and were remarkably fluffy . . . .

Unfortunately for those persuaded of the intermixture of race, direct proof of the illegitimate union of *Gallus* and *Ocydromus* is wanting. Their evidence is mainly derived from predominating resemblances in the offspring to the Rail—such as colour, wing-feather banding or pencilling, hairy feathering, feeble development of wings and tail, form of head, body, and legs, the peculiar furtive, prying, Rail-like gait and nocturnal habits, with the fact of the Weka's freely associating with the fowls in the Maori clearings . . . .

My dissection of the muscles confirmed gallinaceous structure from the myological standpoint; but this rather in the general configuration of parts than in variations of individual muscles from those of the *Rallidæ*. As a matter of fact, there are no salient distinctions therein between the two groups. This has been partly shown by the late Professor Garrod in his two papers, 'On certain Muscles of the Thigh of Birds, and on their Value in Classification.'

I may note that in the reputed hybrid in question an ambiens was present in both limbs, that on the left side (agreeing with Garrod's description of that muscle, P.Z.S., 1873, p. 629) being inserted in, or, rather, fusing with, the topmost fibres of the flexor digitorum, whereas on the opposite right limb the tendon was lost on the fibrous tissue abreast of the knee-cap, and it did not cross to the outside of the joint . . . .

The skeleton emphasized the preponderance of fowl attributes. The skull, in its breadth to depth, naso-maxillary shortening, general robustness of fronto-cranial section, and contour as a whole, could not be mistaken for that of any of the Rail tribe.

The sternum of the asssumed hybrid is quite double the size of that of the *Ocydromus*, and it comports with the gallinaceous type. The body is very narrow and spatular, the keel immensely deep anteriorly, before

which is a broad scooped area, and terminal rostrum; there are also present a pair of very great lateral notches, and exterior broad bony processes on each side . . . .

In the skeleton of *Ocydromus* used for comparison the cervicals were fourteen, dorsals eight freely-separated vertebræ, fourteeen more or less coalesced lumbo-sacral, and eleven caudal vertebral bodies, all free and movable on each other. The entire spinal column and its related parts show a delicacy of mould, and this is very notable in the tail-elements, which organ, be it remarked, has in the Rail tribe only short soft feathers clothing it. There are ten ribs, seven of which are very long, and all are attenuate bony rods; six have mid-costal processes. The last cervical and first ilio-sacral vertebra have each a pair of short free ribs. The chest cavity is unusually deep and narrow, as contradistinguished from that of the doubtful hybrid or that of the common fowl.

From the foregoing data it will readily be conceded that in all the exterior as well as interior organization of the bird under examination scant ground is left for support of its being a hybrid between the fowl and Weka Rail. Assuming no detailed anatomical investigation had been undertaken, the impression nevertheless might remain with those who saw the creature alive, and were acquainted with its currently reported history, that its habits—so opposed to those of the ordinary fowl of the farmyard—could only have been those of a hybrid bird. It behoves, then, to account for these assumed peculiarities of manner; and in the fact that the bird had adopted feral instincts and habits a clue is given to read the case aright.

Darwin, after referring to Wallace's views, says: 'Nevertheless I do not doubt that the simple fact of animals and plants becoming feral does cause some tendency to reversion to the primitive state; though this tendency has been much exaggerated by some authors.' He also admits 'that with crossed animals a similar tendency to the recovery of lost characters holds good even with instincts.'

That a healthy and robust chicken, reared under primitive condititions and in the proximity of a forest or waste lands, should forsake its more domesticated companions, and prefer to lead a free and roving life, accords with the above savant's teachings. It needs no stretch of the imagination, then, to conceive how the reputed semi-nocturnal Rail-like habit is associated with no other than a return to that of the wild stock. The occasional visit to the poultry-yard towards nightfall may have been partly in search of food, but, doubtless, also due to sexual manifestations, for a knowledge of the presence of its kindred in the neighbourhood would be an intuition easily acquired. Much of the averred shyness and timidity may be attributed to the bird's forest seclusion and fear of man. Its skulking, stealthy gait (so characteristic of the Wekas and allied *Rallidæ*) when in quest of food denoted that ever-watchful care for its safety inherent and necessary to wild birds continually on the alert for hidden enemies.

The diminutive drooping tail, much relied on as a ralline feature, is at best weak evidence of hybridity, nor specially favours reversion to feral habit. It, like the plumose, hairy, or flocculent feathering thought to be so extraordinary by the New Zealand observers, rather represents what is characteristic of certain breeds of fowl; while the grass-eating proclivity (witness Cochin-fowl habit) may not only be referred to breed, but with greater probability forced upon the bird by scarcity of graniferous diet. That this reputed hybrid, but nevertheless undoubted fowl, was of mixed derivative origin is denoted by its external characters, superadded to by points in its osteological construction.

I have mentioned in my account of this species that three is generally the maximum number of eggs in the nest; but Mr. Guthrie-Smith, of Napier, writes me that on one occasion he found a nest near the Tutira homestead containing five eggs.

OCYDROMUS EARLI.

(BROWN WOOD-HEN.)

Ocydromus earli, Gray, **Buller, Birds of New Zealand, vol. ii., p. 115.**

As you drive down the magnificent Buller Gorge—shut in by majestic mountain sides covered with dense vegetation—you occasionally get a distant view of the wooded mountain country beyond, as, for example, from the summit of the Hope Saddle, and you see range upon range, far as the eye can reach, culminating in the Spencer Mountains, with their mantle of everlasting snow. These ranges are clothed almost entirely with the sombre black birch (*Fagus*) of this region and especially as seen through the mist, are suggestive of a never-ending rolling sea. This is the home of the Brown Wood-hen, which is still by far the commonest bird in this part of the country. The stoats and weasels are, no doubt, very destructive to the eggs and young of this, as of all other accessible, species; but the bird itself is able to fight these marauders, and is at present sufficiently abundant to withstand their depredations. As I have recorded elsewhere, this species holds its own in undiminished numbers, whilst the other species of Wood-hen are fast disappearing.

The subjoined photograph gives an adequate idea of the natural beauty of the region I have here indicated. It is reproduced, by kind permission, from a negative by Mr. Morris, of Dunedin,

THE BULLER RIVER, N.Z.

undoubtedly one of the best photographers in New Zealand. I am indebted to the same source for all the other photographs reproduced in this volume, except where some other artist is specially mentioned in the text.

As fully explained in my account of this bird (vol. ii., pp. 106, 107), when I came to examine the type of *Ocydromus earli* (described as far back as 1862) in the British Museum, I found that it was not the North Island species, as every writer on the subject had treated it, but a closely-allied form, with pale-red legs, from the South Island. Of the latter bird Mr. Reischek obtained five specimens in 1884, and two of these I purchased and took to England with me. This led to my hunting up the type of *O. earli*, with the result I have stated. By this discovery the common North Island bird was left without a distinctive name. Finding, when I looked over the old type-collection of birds in the British Museum, that Sir George Grey had been one of the earliest and most liberal contributors of specimens from New Zealand, I thought I could not do better than dedicate this species to him.

Notwithstanding this, with a conservative tenacity that is quite remarkable, the old name is retained in the British Museum Catalogue, and reappears in Dr. Sharpe's recently-published 'Handlist of Birds.'

Professor Newton wrote me, in May, 1897:—"About *Ocydromus* and the species of that genus, I have done nothing since I wrote the article 'Weka' in my 'Dictionary,' when I used up all the materials available, and I think the whole matter, if cleared up at all, must be cleared up by New Zealand ornithologists. All I have been able to do has been to direct attention to some points that seemed to have been overlooked or misunderstood."

Having sent Professor Newton a specimen of the Wood-hen from the west coast of the South Island, which I had identified as the true *Ocydromus earli*, he wrote me as follows: "I have been much struck with the Weka, named on the ticket *O. earli*. Last summer I made a pretty elaborate examination of the fairly good series of specimens of the genus we have now here (thanks to yourself, Hector, and Von Hügel), and I feel that we (or, at least, I) have not got to the bottom of the business yet, though I believe that what I have said in the 'Dictionary of Birds' (p. 1,032) is pretty correct so far as it goes. I find it hard to bring myself to think that there are three distinct species in the South Island; but sooner or later this dark point will be made clear, and it would be well that it should be so. What a fine opportunity there is for someone to write a monograph of *Rallidæ*! In regard to *Ocydromus* only, my investigations last summer had produced on me the impression that I had been able to see daylight, but this last specimen of yours has almost shattered that hope."

The late Captain Fairchild brought me a live example of this species from Macquarie Island, a female with lake-red legs and bright chestnut-red eyes; and Mr. Cheeseman showed me a pair that had been brought by the 'Hinemoa' from Solander Island.

Captain Fairchild assured me that the same species of Wood-hen inhabits Solander Island, in Foveaux Strait, as that found by him on Macquarie Island, and identified by me as *Ocydromus earli*. He saw a good many during his brief visit to the island, and caught two, the skins of which were sent to the Auckland Museum, and were probably those shown to me, as stated above.

I have received a fine series of specimens from the valley of the Heaphy, where this Wood-hen appears to be the common species. As stated in my account of the species ('Birds of New Zealand,' vol. i., p. 115), Reischek met with it on Mount Alexander, and afterwards on Cooper's Island, as well as on the mainland opposite, so that the range of the bird appears to extend all the way down the coast.

A specimen from the West Coast (Martin's Bay) has the quills entirely chestnut-brown, owing to the absolute fusion of the barred markings.

I have received from Westport two partial albinoes of this species marked almost exactly alike. They are both males and, having been captured at the same time, they presumably belonged to the same nest. The finer one of the two has the forehead, sides of the head, throat, fore-neck, breast (with the exception of a central patch of brown), and the whole of the abdomen, sides of the body, and flanks pure white; the rest of the plumage normal. The other bird is almost exactly similar in plumage, but has a little more brown on the sides of the head, a larger patch of brown on the breast, and an admixture of brown with the white of the abdomen and thighs.

In Mr. Townson's collection at Westport there is a specimen in which the face, fore-neck, breast and abdomen are white; the rest of the plumage being normal.

To this species no doubt belongs the "brown-and-white Weka, with a pink bill and dark chrome yellow legs" caught by Miss E. H. Warne on the Tataru River, on the west coast, of which a sketch was given in the 'Witness.'

I obtained one example of the Brown Wood-hen on Stewart Island, and I am assured that the Black Wood-hen is found there also. We had landed our party at Price's Cove, in Paterson's Inlet, a charming spot near a sandy beach, enclosed by a thick belt of vegetation, among which the beautiful *Senecio rotundifolia* was conspicuous. Kindling a fire in front of a huge block of granite, we put on our "billy" of tea, and prepared for an *al fresco* lunch. Whilst this was proceeding a Wood-hen came out of the bush and, with characteristic curiosity, peered round in its usual stealthy manner to see what we were about, coming right out on to the beach and approaching to within a few feet of our party. I drove him off to a convenient distance, and then brought him down with a very small charge of shot. He proved to be a male of the above species, and was in very fat condition. I found his crop gorged with the berries of the tataramoa bramble (*Rubus australis*), with which the ground, as I had noticed, was plentifully strewed in the vicinity of our camp.

The only species of Wood-hen that remains with us in undiminished numbers is *Ocydromus earli*, an inhabitant of the wooded country on the west coast of the South Island.

As I have remarked before, the advantage to our native birds from compulsory protection has been amply demonstrated by results. Take, for example, the Tui. In the early days of settlement, this was the commonest of our birds, whilst certainly not the least interesting. But some twenty years ago it was becoming so scarce in all the settled districts, that lovers of birds became alarmed, and in the end the strong arm of the law had to be invoked for its protection. As a consequence, this species is now as plentiful as ever; indeed, in some places, it is visibly increasing. It would, of course, be absurd to expect birds, whose subsistence depends on bush products, to survive in districts where there is a wholesale destruction of the forest. In the miserable little fringes of native bush that are allowed to remain in such districts, the indigenous birds, as might have been expected, are silenced for ever, and, instead of the sweet notes of the Tui, one hears the twitter of the Sparrow or the call of the Californian Quail. But the case is wholly different where ample bush reserves have been made.

Whilst these pages are preparing for press, Captain Hutton writes: "I have just got a specimen of *Ocydromus earli* from Stewart Island. It seems to be a well-defined species."

During a discussion in the House of Representatives as to the propriety of protecting the Wood-hen in the South Island, it was stated by a Minister of the Crown that he possessed authentic information that this bird was increasing on the Canterbury Plains, and might therefore be left to take care of itself. As to certain favourable localities, this statement is no doubt quite true; but to those who remember how abundant the Wood-hen was on the plains in the early "'sixties," it will seem now that the bird is practically a thing of the past. I recollect when travelling on horseback towards Waimate South in 1859, accompanied by a single Maori, we were

overtaken by darkness, and had to camp in the open, using our saddles as pillows. It was a fine night, although somewhat dark, and my companion's little dog spent the night in catching Wood-hens; but these were all of the other species, *Ocydromus australis*. The ground was pretty thickly covered with stunted *Coriaria*, and the birds were, no doubt, feeding on the berries of that plant; at any rate, the dog had no difficulty in running them down. The speedy and very general destruction of the Wood-hens on the Canterbury Plains was occasioned chiefly, I think, by the tussock-fires which about that period, and later on, were so universal for the purpose of improving the grazing capabilities of the newly-occupied sheep runs. That this bird will increase rapidly enough when under careful protection is beyond doubt. I remember seeing at Government House, in Wellington, about the year 1863, a cage full of them which Sir George Grey had brought from the South Island, and was taking up to his island in the Hauraki Gulf. When, many years later, I visited the "great proconsul" at Kawau, he told me that the Wood-hens had so increased and multiplied that he was practically unable to keep any other ground-birds on the island. The Maori member, Mr. Parata, on the occasion referred to above, urged as a reason for preserving the Wood-hen that the oil produced from its fat was useful medicinally. To the zoologist other more cogent reasons will suggest themselves. As every student knows, as a flightless bird it is one of the most interesting of our endemic forms (see vol. ii., pp. 108-9).

To show how completely the Wood-hen has disappeared from some districts, I may mention that Mr. Morgan Carkeek, during several months' surveying several years ago in the mountainous district of Marlborough, met with only a single example. This, in a district where at one time it was extremely abundant, is very significant.

The same remarks apply, in a modified degree, to *Ocydromus greyi* in the North Island. In certain restricted localities it appears to be increasing. A few years ago it had quite disappeared from the Ohau district, and its pleasing cry—so like the plaintive call of the European Curlew—was a thing of the past. But during the last two seasons, prior to my leaving the Colony, it had reappeared at Papaitonga, breeding in a wooded gully near the homestead, and on the approach of evening announcing its presence by its shrill cry. On any quiet evening at the lake you could hear the Weka's cry, in which both sexes join; and, mingling with it, the call of the Pukeko in the sedges, the loud boom of the Bittern in the swamp below, and the pleasant chattering of numberless Wild-duck and Teal, of which there are sometimes five hundred or more on the bosom of the lake.*

I have in my collection a remarkable albino of the Brown Wood-hen. The forehead, face, fore-neck, and breast are pure white; five of the quills in one wing and six in the other are entirely white; there are a few white feathers scattered among the wing-coverts, and there is a large

* On this subject I have received the following very interesting letter from the Hon. L. Walker, M.L.C. (of 'Four Peaks,' Geraldine): "I read with much pleasure the signed article contributed by you to the *Press* as to the disappearance of certain of the New Zealand birds. Among these you mention the Wood-hen. All about my place I have a lot of scrub and (sub-alpine) bush, and the number of Wood-hens that I used to have was something wonderful. I think it was somewhere about five years ago that they suddenly disappeared, and for three or four years their note was never heard in the evenings, nor at any other times. The bush was still there for them, for I never allow a stick to be cut out of it. However, last year I began occasionally, but rarely, to hear them tuning up in the evenings, and this year there are hundreds of them. But they seem to stick about the gardens and under the Lawsonias, cedars, &c., rather than go into the bush. This, I fancy, they do so as to be handy to the hens' nests, for my women say they take most of the eggs. I used to have thousands of Tuis, Bell-birds, and Pigeons: the last, of course, are clean gone. But I have still a good lot of the other two, although they come and go at different seasons. Just opposite my house I have got a lot of kowhai-trees, which in the beginning of October are a mass of yellow blossom. Then comes the holiday time for the Tuis, Bell-birds, and Kakas. They are there in hundreds; but most of them go away as soon as the blossom is over, which, as you know, is but a short time. However, there is never a sunshiny day in winter that I have not a few native birds singing in my garden."

admixture of white in the plumage of the abdomen, sides of the body, and flanks. The rest of the plumage is normal. To judge from its large size, it is a male bird. I obtained it, through a dealer, from the west coast of the South Island.

Mr. Morgan Carkeek, who has more recently returned from a two months' surveying expedition through the mountainous country in the interior of the Marlborough District, found, to his astonishment, that the South Island Wood-hen had vanished altogether, for he had again met with only a single example during the whole of that time. He attributes this result entirely to the ravages of the imported stoats and weasels, which have become fairly established in that country.

My collector, Charles Robinson, found this species of Wood-hen extremely abundant in the woods on both sides of the Heaphy River, during his long quest after *Apteryx haasti*, and he and his son lived on them the whole time. He brought me back several specimens, thus placing its identity beyond doubt.

Seeing that the range of this species in New Zealand is, so far as we at present know, restricted to a portion of the west coast of the South Island, its occurrence on Macquarie Islands, about five hundred and fifty miles to the south-south-west of New Zealand, is a very curious fact in geographical distribution. It is said, however, and probably with truth, that this bird was introduced by the early sealers visiting the island.

Dr. Sharpe stated at a meeting of ornithologists (Bulletin B.O.C., vol. i., 1892-3, pp. 29 and 30) that he could detect no difference between Mr. Gray's *Ocydromus earli* and my *O. greyi*, and "admitted his inability to separate them even as races." Dr. Sharpe, whose great skill as a systematic ornithologist I of course recognise to the utmost, has evidently been misled in this instance by the examination of dried skins in a museum. If he had seen fresh specimens of the cinnamon-tinted, lake-red-legged bird and the common brown-legged Weka, side by side, he would have no difficulty in distinguishing them. He adds that the type of Gray's *O. earli* (which, according to the Museum label, came from the South Island) is a *young* bird; but I confess it did not appear to me to be an immature bird, when I examined it some years ago, and Mr. Gray, who named and described it, certainly did not regard it as a young example. His theory, moreover, that the differences in Gray's type pointed out by me may be due to immaturity does not meet the case, as will be seen on referring to my account of the young birds (vol. ii., p. 106.)* No one, I suppose, will accuse Professor Newton of being a "splitter"; and I have quoted, on page 53, what he wrote on receiving from me a specimen of what I call *Ocydromus earli*, obtained in the South Island. It had not only "disturbed," but "almost shattered," his conclusions, after a most careful examination of Museum specimens in this country.

For my own part, I may say that I could pick out a single example of *Ocydromus earli* from a hundred of *O. greyi*, and *vice versa*. It will be admitted, therefore, that this difference is pronounced, and not fanciful. The former species is confined to the South Island, and the latter, as strictly, to the North Island. It matters not to me whether they be regarded as species, sub-species, or permanent races, so long as they are distinguished.

Captain Hutton writes me (December 13, 1901):—"The 'Discovery' expedition has brought a lot of *Ocydromus earli* from Macquarie Island (introduced by the sealers), and one specimen of what I take to be a hybrid between *O. earli* and *O. australis*. These specimens have convinced me that

* Dr. Sharpe expresses some surprise that I should have introduced, between the descriptions of two such nearly allied species, that of the very distinct *Ocydromus brachypterus*; but they are all members of one genus, and it ought to be obvious enough to anyone that this was done because I had figured the last-named species and *O. greyi* on the same plate. I might as pertinently ask why Dr. Sharpe himself, in the British Museum Catalogue, has placed twelve species of *Rhipidura* between two closely allied New Zealand forms, *R. flabellifera* and *R. fuliginosa*?

no specific difference can be drawn between *O. earli* and *O. greyi*." But, later on (March 13, 1902), he wrote as follows:—"I have just got another Weka skin (*O. earli*) from Stewart Island, and I agree with you that it is different from the North Island bird. I also agree with you that hybrids are very rare in a wild state." He adds: "*Ocydromus hectori* differs from *O. australis* in its uniformly larger size, but its colour is very variable. It is distinctly sub-alpine. *Ocydromus finschi* I now look upon as a hybrid between *O. brachypterus* and *O. australis*."

My view is that the so-called *O. hectori* (which is probably distinct) is the same as *O. troglodytes*, and that the so-called *Ocydromus finschi*, instead of being a hybrid, is the immature state of *Ocydromus brachypterus*. I stated my conviction on this point (with the type of Hutton's *O. finschi*, received back from America, before me) in 'the Birds of New Zealand' (vol. ii., p. 113), and what evidence I have since been able to collect has only strengthened that view. Indeed, I thought Captain Hutton himself had adopted it (see footnote to my account of *Ocydromus greyi*, vol. II., p. 105); but it cannot be denied that the group is a very puzzling one.

An anonymous correspondent in the *Lyttleton Times* (May 20th, 1903), writing of this species, says:

> When enclosed in small yards they become tamer than domestic fowls, thrusting their heads through the meshes of the wire and feeding from the hand. Mr. Smith, in 1885, endeavoured to procure hybrids between the Weka and the domestic game fowls, and so settle the question of crossing. He raised a nest of young Wekas, with one domestic well-bred game cock. He was not successful in attaining his object, but his experiments showed that the Weka's power of laying eggs is surprising. One bird laid for the first time on August 4th, and by August 20th it had produced eleven eggs. It then discontinued laying for nine days. After that, it continued to lay, on an average, every two days, missing a day or two occasionally. Two of the birds contracted the pernicious practice of eating their own eggs. The eggs, when cooked, were found to be slightly inferior to those of the domestic fowl. He states that the Weka, in its natural state, mates only once, and remains permanently paired, unless by some means the pair are separated. Writing last week, Mr. Smith states that during the past three years he has renewed the experiments, but still, up to the present, without success. By carefully feeding the Wekas with suitable food, he has no difficulty in getting them to lay from two to two-and-a-half dozen eggs each in a season. Before laying they generally utter a peculiar call, and then they must be shut off until they lay. 'If by any possibility hybrids could be obtained,' he says, 'their good qualities for laying, which appear to exist on the side of their wild parents, would probably mark the origin in our country of a useful and hardy strain of domestic fowls.'

As all experiments of the kind have hitherto failed in New Zealand, it is interesting to record that, quite recently, a hybrid has been produced by a male *Ocydromus brachypterus* and a female *O. earli* in the Zoological Gardens at Regent's Park. Mr. R. I. Pocock (the Superintendent of the Gardens) writes to me* on June 30th:—

> "Had it not been for the hatching of one of the eggs there would have been no proof of the fertility of the two species. The hen has laid a good number of eggs this season, but the two birds have destroyed them, almost without exception. This is a well-known habit of theirs, I believe, in captivity. The solitary young one is thriving well."

* After getting this note I took an early opportunity of visiting the Society's Gardens for the purpose of inspecting the hybrid; and the Superintendent courteously had the bird caught, so that I might make a close inspection. The male parent is a very robust and remarkably tame example of *Ocydromus brachypterus*, obtained from the Snares, where this species was, no doubt, introduced by the early sealers, to eke out their subsistence. The female parent is a small and very shy example of the true *Ocydromus earli*, from the South Island. The young bird which, at the time I saw it, was fully fledged, favours in appearance the male parent, even to the whitish chin, but it lacks the light brown spots on the upper surface, which are so conspicuous in the young of *O. brachypterus* as to have induced Captain Hutton to set up a new species (*O. finschi*).

OCYDROMUS AUSTRALIS.

(SOUTH-ISLAND WOOD-HEN.)

Ocydromus australis, Sparrm; **Buller, Birds of New Zealand, vol. ii., p. 116.**

After debouching from the mountains, the coach-road through the Buller Gorge passes over a succession of hilly downs before it reaches the Canterbury Plains. Not a bird is to be seen of any kind, except that occasionally a Wood-hen trips across the road and disappears in the rank tussock-grass, or a Harrier (*Circus gouldi*) is to be seen circling high in the air surveying the ground below.

In spite of its feebleness of wing, this species of Wood-hen continues to hold its own in many districts of the South Island. It is very prolific, and breeds freely in confinement. Mr. W. W. Smith, of Ashburton, sent me a fine series of eggs which had been laid by birds in captivity. In the letter accompanying them he says: "I have one pair of these birds which have reared two broods and have a third three weeks old. I took the young away much earlier than the parents would have left them, which made them lay much sooner. I have another bird which has laid sixteen eggs. My efforts to procure a hybrid between the Game-cock and Weka have not so far been successful, but I shall persevere with my experiments, and may ultimately succeed." (See Dr. Murie's report on page 50.)

I have received two albino specimens of this species from the South Island. One is a male bird from Otago, in which the whole of the plumage is pure white, with the exception of a slight creamy tinge on the shoulders and upper-surface of wings; bill and feet whitish-horn colour. The other is a female bird from Canterbury. This, too, is all white, except that vestiges of the normal plumage appear on the wings and flanks, and an irregular sprinkling of brown on other parts of the body; there is also a shade of ash-grey on the abdomen.

There is now living in the Gardens of the Zoological Society, in Regent's Park, a pure albino of this species, brought to England by H.R.H. the Prince of Wales on his return from his historic tour round the British Empire. The bird is in perfect condition, and appears to be entirely satisfied with its new environment. Although clothed in the garb of immaculate innocence, this Wood-hen is as aggressive and pugnacious as its fellows, and recently distinguished itself by assailing and killing outright a Straw-necked Ibis (*Carphibis spinicollis*) confined in the same wire enclosure.

No ornithologist in this country has devoted more attention to the New Zealand group of Wood-hens than Professor Newton. In his 'Dictionary of Birds' (1032), under that head, occurs the following: '"The chief interest attaching to the *Ocydromus* is their inability to use in flight the wings with which they are furnished, and hence an extreme probability of the form becoming wholly extinct in a short time. It is to be hoped that the naturalists of New Zealand will not allow this to happen, if any effectual means can be taken to perpetuate it; but, should that fate be inevitable, it at least behoves the present generation to see that every possible piece of information concerning the birds be recorded, and every possible preparation illustrating their structure be made, while yet there is time; for, though much has been written on the subject, it is obvious from one of the latest papers (Trans. New Zealand Institute, x., p. 213) that there is still more to be learned, some of which may throw further light on the affinities of the extinct genus *Aptornis*."

And, in a letter to myself, dated 30th April, 1902, he says: "I have sometimes been inclined

to think (though I am afraid of theorising) that an explanation of the Weka puzzle may be somewhat similar to that which I have long suspected to be the case with *Dinornis* (using the word in the widest of senses). From the inherent tendency to vary, local forms sprang up, among which there was not enough competition to give any one a decided advantage over another, so as to produce what we ordinarily call 'species.' I think I gave a hint to this effect years ago in regard to the extraordinary variation observable in the bones of the Solitaire of Rodriguez, but I don't mean to say that I then saw the full meaning and importance of it. If New Zealand had got itself broken up into small islands, each one would probably have had its own well-marked Moa and Weka; or if there had been many active enemies preying upon them, that would have hurried on and rendered more marked any differentiation; but, instead of that, the 'environment' went on pretty uniformly, and there was no need for one form to become predominant. You know that I always look upon the word 'species' as representing a convenient abstraction (in fact, we could not get on without it), but it means nothing more."*

On exhibiting to the Ornithological Club a collection of the various species of *Ocydromus*, Dr. Sharpe said†: "With regard to *O. australis*, the question of races was much more difficult, and at first sight it would appear that two well-defined forms could be distinguished—one a sandy-tinted bird, and the other a cinnamon-tinted one. Between these two, however, there appeared to be every possible link and gradation of colour; so that it was impossible to define any races or sub-species." In 1894, however, Dr. Sharpe says‡: "On looking over a large series, there seems to be a complete intergradation between these two forms [the sandy-buff and the cinnamon-coloured], which may therefore be only climatic varieties, and the difference in plumage may depend on locality. Sir Walter Buller, in fact, mentions that the Alpine birds are paler than those from the lower country; but there seem to me to be other forms which, if carefully studied, would probably be found to have a distinctive character and geographical distribution, so that the question of the South Island Weka Rails can by no means be considered settled."

* Mr. R. Etheridge, jun., in his 'General Zoology of Lord Howe Island,' writes:—"Soon to become extinct on Lord Howe, unless protected, is the Wood-hen, *Ocydromus sylvestris*, Sclater, a curious and stupid bird. At the present time its range is confined to the extreme southern end of the island in Erskine Valley, and the ground around the sea-girt base of Mount Gower. It is even now rare and difficult to obtain, and would be impossible of capture were it not for the fact that its curiosity overcomes its shyness. Its gradual extinction is probably due to the ravages committed by the wild domestic cats. During a journey to Mount Gower, primarily to procure specimens, only one individual was seen, and during the whole of our residence there, those well acquainted with their haunts could obtain but four others. *Ocydromus sylvestris* can be attracted within gun-shot by any continuous and varied noise, such as knocking two stones together, striking against a tree, and occasional whistling, and other peculiar but discordant sounds. Mr. R. D. Fitzgerald, Deputy Surveyor-General, during a trip to Mount Gower at the time of Cloete's Expedition, had an excellent opportunity of witnessing the method adopted by the Islanders for catching this bird. His account is as follows: 'Ned suddenly stopped with the exclamation, "That's a wood-hen!" as a note like two rasps at a saw is heard at some distance among the lower stones and fern. Then he imitates the bird, and the Wood-hen answers. He tries the imitation again, but the bird is silent. Tom strikes the back of the tomahawk against a tree; again the bird answers. Then the strokes of the tomahawk are of no use, and the barking of a dog is tried with effect, at each time the answer being a little nearer, and so on. Anything that strikes him as strange, say a scrap of the National Anthem by all hands, or the crowing of a cock, or anything else with which the bird is not likely to be acquainted. Nearer and nearer comes the answer, till suddenly out runs a bird, like a large corn-crake, in a daft sort of way, up to their very feet.'"

† Bull, B.O.C., vol. i., 1892-3, pp. xxix. and xxx.

‡ Cat. Birds, B.M., vol. xxiii., p. 66.

OCYDROMUS HECTORI.

(BUFF WOOD-HEN.)

Ocydromus brachypterus, Lafr.; **Buller, Birds of New Zealand, ii., p. 119.**

As Dr. Sharpe has pointed out, this species was wrongly identified in my work, the name *brachypterus* (Lafresnaye) belonging properly to the Black Wood-hen (see p. 61). It therefore becomes *O. hectori* (Hutton.)

In treating of this species (vol. ii., p. 120) I said: "It is with some hesitation that I accord specific rank to this bird, for, although my collection contains some beautifully marked specimens, they intergrade to such an extent that it is extremely difficult to draw any distinct line between this species and *O. australis*." I am still of that opinion; but as a good many more specimens have been obtained, from time to time, of this extreme type, I think it is better to keep it distinct.

Captain Hutton, in discriminating this species, wrote*: "In size and style of colouring this bird resembles *O. troglodytes* [treated in this work as a form of *O. australis*], but its bill is more robust, and its general hue is isabella-brown, or fawn-coloured; the primary feathers of the wing are rounded at the tip, and the brown bands on the webs are very narrow, sometimes becoming obsolete."

Dr. Finsch says of it: "This I consider to be a good species, after having compared a typical specimen kindly lent me through the Colonial Museum at Wellington."†

Mr. Brough writes me that in the Nelson district this pale-coloured form inhabits the Sub-alpine country "amongst small scrub and snow-grass."

The young of the buff Wood-hen differs from that of *O. australis* in its much lighter colouring and more distinctly barred character.

Professor Newton says in a letter to me (29th January, 1902):—"The *Ocydromi* are very puzzling birds, and I doubt whether we have got to understand them yet—certainly I do not, though on one of your visits you helped me considerably in that direction. All you have sent us are marked *Ocydromus greyi*, except one marked *O. earli* (see p. 53). Of *Ocydromus hectori* (Hutton) and *O. finschi* (Hutton) I can say nothing, as I have never seen typical examples. We have in our collection about a dozen of what I take to be *Ocydromus australis* and three of *O. fuscus* (now known to be *O. brachypterus*), which appears to be a very distinct form. I find it hard to bring my mind to the belief that there are three species in the South Island. Don't think for a moment that I wish to set up my opinions on New Zealand birds against yours. That would indeed be folly." Notwithstanding his modest way of putting the case, I may truthfully say that there is no living ornithologist to whose judgment I attach more weight than Professor Newton. This may indeed be inferred from the frequency of my quotation of his opinions in the course of this work. But that there are at least three species of *Ocydromus* in the South Island, does not admit of a shadow of doubt. Whether I am right in recognising, even provisionally, a fourth species, as I am doing now, is of course a matter of opinion. But it must be remembered that Dr. Finsch and Captain Hutton (both of them very careful ornithologists) recognise a fifth—*O. finschi*.

* *Trans. N. Z. Inst.*, vol. vi., p. 110. † *Trans. N. Z. Inst.*, vol. vii., p. 231.

OCYDROMUS BRACHYPTERUS.

(BLACK WOOD-HEN.)

Ocydromus fuscus, Du Bus; **Buller, Birds of New Zealand, vol. ii., p. 112.**

Dr. Sharpe reports that he has examined the type specimen of *Gallirallus brachypterus* from the Caen Museum, for the loan of which he was indebted to Professor Joyeux-Laffine, the Director of that Museum. Dr. Sharpe points out that the species has been the subject of much controversial opinion, but that it is evidently the same as *Gallirallus fuscus* of Du Bus, which must therefore be known as *Ocydromus brachypterus* (*Bull. B.O.C.*, January, 1873). In other words he has demonstrated, from an examination of the type, that Mr. G. R. Gray was perfectly right in his identification of this bird in 1862 (*Ibis*, vol. iv., p. 238) and that all the rest of us have been wrong.

The following appears to be the history of the confusion that has arisen over this name. In 1868, believing the Black Wood-hen to be a new bird, I described it, in New Zealand, under the name of *Ocydromus nigricans*, on specimens obtained by Dr. (now Sir James) Hector, on the south-west coast of the Otago province.* Dr. Finsch afterwards identified my bird with *Gallirallus fuscus* (Du Bus), which, he stated, Mr. Gray had confounded with *G. brachypterus*, (Lafresnaye). Assuming that Dr. Finsch had examined this type, I did not hesitate to follow him, in my first edition of 'The Birds of New Zealand,' and Captain Hutton did the same in his 'Notes on the New Zealand Wood-hens' (1874).† But in a subsequent article, Dr. Finsch wrote: "I did not compare the type of Du Bus, as Dr. Buller seems to think, but only the figures which, in many respects, differ from the descriptions."‡ Later on he wrote: "*Ocydromus brachypterus*—said to come from the Chatham Islands, but without evidence—is the same as *O. hectori* (Hutton)."§ Dr. Sharpe, in his 'Appendix to the Birds' of the 'Voyage of the Erebus and Terror' (1875), adopted Dr. Finsch's identification of *Ocydromus fuscus*, and (following Hutton) admitted also *O. troglodytes*, *O. hectori*, and *O. finschi*.

Professor Newton writes in his 'Dictionary of Birds' (p. 1031): "This specific term *(fuscus)* has generally been preferred, in the belief that the *Rallus troglodytes* was identical with the *R. australis*, figured and described in 1784 by Sparrman (Mus. Carlson, i., No. 14); but the two birds appear to be distinct, both in coloration (though this in each is variable) and habit—the former frequenting the sea-shore (whence one of its names—Kelp-hen) and feeding chiefly on shell-fish and other marine products, while that which is commonly identified with the latter, ranges widely through the interior of the South Island of New Zealand—examples from the western side of the Alps being, however, apparently distinguishable by wanting the barred flanks, and in that respect resembling another form which inhabits the North Island and is, according to Sir W. Buller, who named it *O. greyi*, peculiar thereto. That these three or four forms should be justly considered good species is very probable; but that more species should exist in New Zealand seems unlikely. It was for some time called *O. earli*, the name under which Dr. Sharpe (Cat. B. Br. Mus., p. 66) still has it, but Sir Walter states that the type of that form (*Ibis*, 1862, p. 238) agrees with some specimens from the South Island, and he recognises it as a distinct species. He also admits an *Ocydromus brachypterus*, which is certainly not that of Lafresnaye and, if distinct, should probably be called *O. hectori*."

* *Trans. N. Z. Inst.*, vol. i., p. 111 (1st. edition).
† *Op. cit.*, vol. vi., p. 111.
‡ *Op. cit.*, vol. vii., p. 231.
§ *Op. cit.*, vol. viii., p. 202.

The Black Wood-hen appears to inhabit all the west-coast Sounds. My first examples were received from Sir James Hector, who collected a good many specimens during his geological exploration of that region in 1865. At Dusky Sound, at night, I heard the cry of the Wood-hen (probably *O. brachypterus*) on all sides. The note does not differ from that of the other species.

An adult and chick in my collection (received from Marklund) came from Table Hill, on Stewart Island. Of the latter I took the following note: "Apparently about a month old (end of November); covered with thick and long blackish-brown down, which has evidently taken the place of an earlier growth—short, woolly, and of a greyish-black colour—vestiges of which are still to be seen on the back of the neck and above the shoulders; feathers of a blackish-brown colour are beginning to appear on the shoulders and on the sides of the neck and body, the latter barred with paler brown."

I have more lately obtained a living pair from the west-coast Sounds. Like the other species, they are almost omnivorous, and large feeders, and I have noticed that they have a great partiality

THE WOOD-HEN'S NEST.

for the common garden-snail, breaking the shell by a prod of their powerful bills and tearing out the contents after the manner of a true expert. Doubtless the common Wood-hen would do the same, in which case it would be a most valuable introduction into gardens infested with snails, as are most of those in New Zealand.

The Black Wood-hen has all the habits of the more common species, so fully described elsewhere (vol. ii., pp. 106-111), but it has a peculiar note, frequently emitted, and responsively, when the birds are together, so much like the clucking of domestic hens, that it is difficult to believe one is not in the vicinity of a poultry yard.

Captain Hutton writes to me: "Mr. H. Travers showed me two specimens of my *O. finschi* from Lake Te Anau. I recognised the bird at once, and think that it deserves to be separated as a variety of *O. australis*, if not a separate species." My view is that the so-called *O. finschi* is, in reality, the young of *O. brachypterus*; the plumage of the immature bird assuming a more or less spotted character.

PORZANA AFFINIS.

(MARSH RAIL.)

Ortygometra affinis, Gray; **Buller, Birds of New Zealand, vol. ii., p. 103**

There are two young birds in the Southland Museum similar to the adult, but much paler and greyer, and with the barred markings on the flanks almost entirely absent; the plumage is dull brownish-grey, mixed with dark brown on the upper parts.

Mr. Pycroft writes (*l.c.*, p. 144): "I have obtained two from Waikare. On dissection the stomach of one contained minute shells."

PORZANA PLUMBEA.

(SWAMP RAIL.)

Ortygometra tabuensis, Gmelin; **Buller, Birds of New Zealand, vol. ii., p. 101.**

Through the kind assistance of the late Captain Fairchild, who thought he was bringing me something quite new, I received a pair of this widely spread species from one of the small islands that compose the Kermadecs. A boy had practically risked his life in swimming off to the island, in spite of the sharks, to procure them, so I rewarded him liberally and placed the skins in my collection.

There was an example of this Rail in a small collection of birds I received from Nuia-Foou, a remote volcanic island in the Tonga group.

Young. There is a brood of three in the Southland Museum, presumably from the same nest; they are fluffy, and blackish-brown in plumage, changing to slaty-grey, first on the breast, then on the hind neck.

Mr. Pycroft says (*l.c.*, p. 144) that his "specimens were taken from a settler's cat." All the specimens of this bird in my collection (except those from the Kermadecs) were procured in a similar manner. Indeed, as I have previously mentioned, we are indebted to the household cat for nearly all our museum specimens of this pretty little Rail. Mr. Hamilton (from whom I have received some very perfect specimens) records that during the years 1881-83 a cat belonging to one of his neighbours brought him in twelve specimens of this species, and seventeen of its near ally, *P. affinis*.

PORPHYRIO MELANONOTUS.

(SWAMP-HEN.)

Porphyrio melanonotus, Temm. ; **Buller, Birds of New Zealand, ii., p. 79.**

Since the publication of 'The Birds of New Zealand' several instances of albinism, more or less complete, have been recorded. I exhibited, at a meeting of the Wellington Philosophical Society, a very curious example that I had received from Nelson. In this bird all the primaries in each wing are crossed near the tip with a broad band of yellowish-white ; the secondaries are similarly marked, but not so sharply, and so are most of the wing-coverts, imparting a mottled appearance to the upper surface. The tail-feathers are broadly tipped with yellowish-white, and there are a few scattered white feathers on the shoulders and on the underparts. The rest of the plumage is normal. A partial albino obtained at Lake Ellesmere has the entire body varied with pale-brown and white feathers intermixed with the ordinary plumage, the feathers composing the mantle being almost entirely pale-brown and brownish-white ; wings and tail normal, except that the primaries are whitish on the outer vane towards the base ; under tail-coverts pure white. Another specimen from the same district has a few white feathers scattered over the breast, and among the wing-coverts, whilst all the quills and tail-feathers are pure white, with terminal bands of brownish-black.

I take this opportuity of mentioning a Swamp-hen from the Chatham Islands described as new by Dr. Bowdler Sharpe under the name of *Porphyrio chathamensis* (Cat. Birds Brit. Mus., xxiii., p. 202). He gives the following diagnosis of the species : "Similis *P. bello*, sed gutture toto nigro, pileo concolore ; præpectore saturate cyaneo ; tibiis nigris, abdomine imo concoloribus"; and he adds, "The tints are difficult to describe, but the differences are well seen on comparison with *P. bellus*." It seemed to me highly improbable that there should be a differentiated species of this widely-spread form at the Chathams, and, although holding Dr. Sharpe's judgment in great respect, I went to the British Museum to examine the type for myself. A single glance satisfied me that the supposed new species was nothing but our ordinary Swamp-hen in an unusual, but by no means uncommon, phase of plumage. The dark head and throat, the highly-coloured breast and dark underparts are merely individual differences of colour, and have no specific value. I would undertake to pick out several birds exactly similar to Dr. Sharpe's at the close of a day's shooting in any locality where Pukekos are numerous.

The Swamp-hen of New Zealand is abundant at the Chatham Islands, and the existence there of another species of so diffuse a form seemed on the face of it most unlikely. I thought I had satisfied Dr. Sharpe as to the untenability of this form as a species, but I observe that it is accorded full rank in his recently published 'Handlist of Birds.'

Writing to me from Rangitikei, Mr. Robert Wilson says : "I obtained two specimens of Pukeko which are partial albinoes, but the pure white one I had seen I was not able to get, though he was seen again."

Mr. Roberts, of Hokitika, informs me that when engaged on a trigonometrical survey he found the dead body of a Pukeko on a mountain top, above the snow-line, at an elevation of fully 7,000 feet. This is very curious, and reminds one of the alleged fondness of *Notornis* for the mountain summit.

Mr. D. G. Polson, writing to me from Mangawhero, near Wangami, about the birds in that district, said: "Now as to the Pukeko. About fifteen years ago I drained a small swamp which was at that time inhabited by some of these birds. I never doubted at the time that when the swamp was dried they would migrate to some other swamp, none being nearer than five or six miles distant. But, contrary to my expectations, they only shifted to the banks of the Wangaehu river, about ten or twelve chains away, and there they have remained ever since. The river-banks are perfectly dry, and there is no sign of swampiness in that neighbourhood. They seem to do well and rear young in a situation unusually dry, except for the waters of the river. Is it another case of adaptation to changed circumstances?"

I have been delighted to hear the sharp cry of the Pukeko—'keo-keo-keo'—in the swamp on the eastern side of my lake at Papaitonga. It has long been a denizen of the swamp at the western end, and now it is spreading its range to the other side. It is pleasing to see this very ornamental bird stalking about the grass fields in the vicinity of its natural haunts.

These beautiful birds are easily domesticated and, when tame, they are greatly prized by the natives as 'mokai,' or pets. The Maoris do not, however, esteem them very highly as an article of food, pronouncing the flesh to be dry and coarse. As a matter of fact, if hung sufficiently long, and then either roasted and served up with bread-sauce, or skinned and made into a stew, they furnish a really excellent dish for the table.

And they are not altogether without their merits as game-birds. Colonel Cradock, C.B., in his charming little book lately published, 'Sport in New Zealand,' * devotes a chapter to the Pukeko, from which I extract the following:—

> One rather curious feature of Pukeko-life is the way they take their meals in a corn-field, especially in a wheat-field. The straw is too long for them to reach the ears of corn from the ground, so they carefully break down the straws half-way up, and bend the upper half over, forming a sort of platform. When the Pukeko has bent over a certain amount, he jumps on to this platform, and discusses all the ears within reach at his leisure, finishing off with the ears he has previously bent over to form his platform! All corn-fields in the vicinity of any place where Pukeko abound are liable to their inroads, and when the corn is cut, regular pathways of platforms are often found.
>
> When driving Pukeko, always carry a long manuka with you, with branches at the top. When a Pukeko is coming towards you, stand still and hold up the manuka in front of you, and the Pukeko will come straight on without any fear. This may seem an improbable yarn, but it is absolutely true.
>
> He is not what you might call a very sporting bird, as he is a beggar to run, and very easy to hit when he does get up; in fact, he is very little different from a Water-hen. The only way to get any sport out of him at all is to collect a large party of guns (ten or a dozen) and walk up wind in line along the edge of any lake, or across a swamp where they are pretty numerous. They will run in front of you till they get to the end of their cover, and then get up, and rocket back over the guns down wind.
>
> They must then be killed very dead, for without a good dog it is as certain as fate that they will never be retrieved. They are most extraordinary hiders, and most tenacious of life.
>
> It is also not bad fun picking them off with a rook rifle.

I have already indicated the wide geographic range of this species (vol. ii., p. 81), but it has since been recorded from Lord Howe Island, from Booby Island in Torres Strait, and from New Guinea.

A closely allied species (*Porphyrio samoensis*)—a first cousin as it were—inhabits Samoa, and another (*P. smaragdinus*) the Fiji and Tonga Islands, New Caledonia, New Britain, New Hebrides, New Guinea and the Solomon Islands. Some ornithologists consider them all one and the same species.

* Anthony Treherne & Co., Ltd., 3, Agar Street, Strand, W.C.

NOTORNIS MANTELLI.

(MANTELLI'S NOTORNIS.)

Notornis mantelli, Owen; **Buller, Birds of New Zealand, ii., p. 85.***

Undoubtedly the most important ornithological event in New Zealand, since the publication of my book, has been the capture of another specimen—only the fourth—during more than half a century, of the Takahe (*Notornis mantelli*). On hearing that this valuable bird had been sent in the flesh to the Otago Museum, I telegraphed to that institution for additional information, and immediately received the following reply from Professor Benham: "Every particle of *Notornis* preserved; young female in perfect condition, but coracoids injured." A few days later I received a letter from Mr. George Fenwick, the editor of the *Otago Daily Times*, containing further particulars. He writes: "I have been very much interested in the recent capture of a Takahe by young Ross—brother of the Te Anau-Milford guide—and had an opportunity this morning of inspecting it. It is a fine specimen, and realises the impression of the bird gathered from the striking illustration in your book. The two specimens in the South Kensington Museum are disappointing—one of them particularly so. The better one of the two cannot compare with the specimen just captured, the plumage of the latter being bright and glossy, whereas that in the South Kensington Museum is dull. Jennings has done his work well, the new Takahe presenting the firm, well-set up, striking look with which we have been made familiar by your illustration. I hope it may be secured for the Colony. I have written to Ross on this point, and if I make any progress will let you know. I am posting you a copy of to-day's *Times*, with some notes on the bird and the species by Professor Benham."

The article referred to—in the issue of the 23rd August—gives an interesting, popular account of *Notornis* and its discovery, from which I quote the following: "In size the bird is like a goose, but in colouration it resembles the Pukeko; its breast is a beautiful rich dark blue, becoming duller on the neck, head, abdomen, and legs. These last are clothed with feathers for a greater distance than in the Swamp-hen, but they are relatively shorter and much thicker than in the latter bird. The legs in both birds have the scaly part, technically termed 'tarso-metatarsus,' as well as the toes, coloured salmon red. The feathers of the back, wings, and tail are olive green, with an almost metallic lustre, in certain lights; below the short tail the feathers are pure white. When the bird is seen, from in front, these colours are at their brightest and best; seen from behind—as when the bird is running away from the hunter—the brightness is lost: the blue becomes dull and nearly black, the green becomes greenish grey, so that, if it were not for the white under tail-coverts, the bird when retreating would be very inconspicuous in the feeble light of the bush. This white tail-piece occurs in the Pukeko, as well as in some mammals, such as the rabbit and deer, but its meaning is not always obvious; although the general inconspicuousness to foes is diminished, yet its recognition by friends appears to be attained thereby. The eyes are reddish-brown. But perhaps one of the most noticeable features of the bird is its

* As already stated (vol. ii., p. 89), Dr. A. B. Meyer, the able Director of the Royal Zoological Museum at Dresden, having critically examined and described the bones of this bird, pronounces it a different species from that the bones of which were described and delineated by Professor Owen (*Trans. Zool. Soc.*, iii., 1848), and he proposes to distinguish it as *Notornis hochstetteri*; but, to my mind, the point is not so completely free from doubt as to justify me in setting aside a name so widely known and so generally accepted as *Notornis mantelli*

beak—a great equilateral triangle of hard pinkish horn-colour, with one angle directed forwards. At the upper side of the base of the beak is a bright red band of soft tissue like an attempt at a 'comb,' such as we get in cocks, only transversely placed. The whole is a handsome bird of heavy gait, absolutely unable to use its wings for their natural purpose of flying. Indeed, one of the interests, zoologically, is that, like several of our native birds, it is flightless, while its congeners in other countries are endued with powers of flight. The Takahe is closely allied to the Pukeko (*Porphyrio*), and not far removed from the Brown Wood-hen (*Ocydromus*), all these belonging to the family of Rails, which usually frequent more or less marshy ground, and in other countries are able to fly as well as other birds. On the other hand, the Takahe can run very actively, and gave a good chase to those who captured the earlier specimens, while its powerful beak must be a formidable weapon, one would think, which it could use with effect on enemies when at close quarters. The nature of its food is practically unknown. The previous specimens did not reach scientific hands till after the removal of the viscera; the present specimen, however, reached me in such excellent condition that I have been able to examine all the internal organs, and I find the stomach and intestines filled with a kind of grass with cylindrical leaves, all cut up into lengths of $\frac{1}{4}$ in. to $\frac{1}{3}$ in. But whether this is its normal food or not, is uncertain. Like its predecessors, it was caught in winter on low-lying grounds near the water; but there is no doubt that it lives usually in the higher and rougher bush, and that it was probably driven down to the water's edge by stress of weather and the consequent difficulty of getting enough to eat. Certain it is that, though thoroughly healthy in every way, there was no fat in the body such as one finds in a normally well-fed bird; moreover, its beak seems needlessly powerful for cutting up grass.

"The present specimen is a young female, possibly not quite fully grown. The measurements of the various external parts of the body agree almost exactly with those given by Sir W. Buller for the bird examined by him nearly twenty years ago. Yes; it is nineteen years since the previous specimen was captured, and—*pace* Mr. Park—it is uncertain whether any have even been seen since 1879; at any rate, I believe there is no record of such a fact. Even a greater length of time separates the capture of the third from the first specimen—to wit, thirty years—for it was in 1849 that the first specimen ever seen by scientific folk was chased and captured by a party of sealers in Duck Cove, Dusky Sound. Of this the skin alone remains, stuffed and set up in the British Museum; the rest of the bird was eaten by the captors. The second specimen, which was caught in 1851 by Maoris on Secretary Island, Thompson's Sound, also found its way to the British Museum. The third specimen was caught by a rabbiter's dog (1879) on the eastern shore of Lake Te Anau, and its remains were purchased for the Dresden Museum for one hundred guineas. The three spots at which the captures were made are at the corners of a triangle, each side of which measures about a hundred miles. It is scarcely surprising, then, that this, the fourth specimen of the bird, now temporarily deposited in the Otago University Museum, should be the cause of some excitement amongst all those—and these are happily many—who take an interest in the birds of New Zealand, especially in those which, like the Takahe and the Kakapo, are on the way to extermination—a result of the interference with the 'equilibrium of nature' brought about by the ferrets so thoughtlessly introduced by a too impulsive Government some years ago.

"The specimen now in the Museum belongs to Mr. Ross, brother of the guide of that name. It appears that Ross was walking along the shore of Lake Te Anau, accompanied by his dog, which suddenly disappeared into the bush, and reappeared carrying the Takahe. Mr. Ross, fortunately for science, despatched the bird to Dr. Young, of Invercargill, who wired to me to inquire whether I could recommend a taxidermist who could be trusted to preserve the bird with all the tender care merited by its rarity and interest. The Museum luckily possesses, in the person of Mr. E. Jennings, not only a skilful taxidermist, but an ornithologist who

can value a bird for its own sake. So I replied to Dr. Young to send it along; and I announced the receipt of his telegram to the meeting of the Otago Institute on the 9th August, where the news was received with very great interest. Mr. Hamilton took the trouble to travel to Invercargill next day in order to bring back the bird, and to learn the facts of the capture, but in the meantime it had been despatched to Dunedin, and reached me in capital condition. It was at once handed over to Mr. Jennings. The skin was properly and skilfully cured, so much of the skeleton as was possible was removed and dried, and the viscera are preserved in spirit. Mr. Jennings, it may be mentioned, preserved the Dresden skin, so far as it was possible to do so after its unskilful treatment by its captor. . . .

"But, although the skin of the Takahe is very rare, its bones are less rare and less expensive. The Otago Museum is fortunate enough to possess a nearly complete skeleton, including the only skull on public exhibition in the colony, or anywhere else indeed, except in London and Dresden. Other bones exist in private collections, but they are by no means numerous. Another feature of interest lies in the fact that the Takahe (*Notornis*) exists nowhere else in the world except in the South Island of New Zealand. The name *Notornis mantelli* was bestowed by the late Sir Richard Owen, on a few bones discovered in a fossilised condition in the North Island—viz., a part of a skull, a jaw, and a leg-bone. The examination of the skeleton of the second bird, subsequently captured in the South Island, led ornithologists to conclude that both the living and the extinct bird belonged to the same species. But, later on, careful measurements of the bones in the Dresden Museum by Dr. A. B. Meyer, and of the bones in the Otago Museum by the late Professor Parker, as well as of bones obtained by Mr. Hamilton, render this identity very doubtful. . . .

"It may be that the fossil bones, imperfect as they were, belonged to a male bird, whilst the remaining specimens are females, but this is extremely improbable. At present we do not know for certain whether there is any difference in the colouration or in the size of the two sexes; one in the British Museum, according to Sir W. Buller, is more brightly coloured than the Dresden specimen, which he believes to be a female. But no anatomical examination of any of the previously obtained birds was possible for the purpose of deciding the sex, and the only definite fact is that this fourth specimen is a female, and that it agrees in size and colouration with the Dresden specimen. From analogy with our other native birds it is quite probable that a different species of *Notornis* inhabited each of the two Islands—that of the North Island is extinct, that of the South Island will become so shortly."*

I agree with Mr. Fenwick in opinion that the last specimen is the finest of all four known ones, the colours being richer; also that the bird is better mounted than any of the others. But Mr. Jennings, who is a very skilful taxidermist, had the advantage of mounting his bird from the fresh specimen. The two examples in the British Museum (since placed in the bird cabinets by Dr. Bowdler Sharpe and sheltered from light) were set up by Mr. Bartlett from rough skins prepared by sealers; whilst in the case of the Dresden specimen the taxidermist laboured under this further disadvantage, that the whole of the bones of the head, legs and toes had been previously extracted for the purpose of restoring the Museum skeleton, which is perhaps even more valuable than the skin.

The circumstances under which this fourth example was obtained are thus recorded in the

* In the *Zoologist* for 1889 (pp. 301-6), there is a long article by Mr. James Park, F.G.S., on the survival of this bird in western Otago. This gentleman describes his experiences during a geological and botanical excursion into the Wanaka country in 1881, which led him to the conclusion that *Notornis mantelli* at that time still existed in that part of the country. Sir James Hector, however, and others familiar with that part of the South Island, are of opinion that the loud booming sound heard by Mr. Park was produced by the Kakapo and not by *Notornis*, of which, it may be added, the explorer never obtained an actual view.

Otago Daily Times:—"It appears that on Sunday morning, the 7th August, as the Messrs. Ross lay awake in their bunks, they heard an unusual bird-call in the bush near the edge of the lake, and about 100 yards or so from their camp. In discussing it, they came to the conclusion that it was not unlike a certain double-call often made by the Californian Quail, only more bass—not so sharp and clear as the quail-call. The peculiar call was discussed, but nothing more happened until evening. One of the Messrs. Ross was then taking a walk along the beach just before darkness set in. When near the spot whence had proceeded the peculiar bird-call in the morning, the dog that was with him made a dart into the bush, and shortly after emerged with a bird in its mouth. The bird was not quite dead, and it was at once taken to the camp, where it expired a short time after its capture. Its fortunate captor thought that it was a *Notornis*, and it was taken with all speed to the foot of the lake. Involving as it did a twenty-five mile pull, it was early morning before the foot of the lake was reached; but fortunately there was time to pack the bird securely and despatch it by the mail coach for Lumsden, *en route* to Invercargill."

As an indication of the interest which this fresh capture of *Notornis* excited in the Colony, I may mention that numerous offers were made to the owner for its purchase, for various sums running into three figures. Ultimately it was purchased by the Government for £250, and placed in the Otago Museum. It will thus be kept in the Colony, where it will always be accessible to those of our rising colonists who take an interest in the natural history of New Zealand.

It is said that, after the Government had purchased the specimen, an old settler from Lake Te Anau went to the Museum to see it, expecting to find a great novelty. He looked at it for a moment, and then exclaimed: "Why, them's the birds we lived on all last winter. Our dogs used to catch 'em in the swamp!" Probably he was confounding it with the Pukeko; but that bird flies, when pressed hard, and is not easily caught by a dog. At any rate, I understand that the old man's commentary, when reported to the Premier, who had just before authorised the payment, had a very disquieting effect.*

Before leaving the Colony I had an opportunity of examining the last captured specimen of *Notornis*, and made the following notes:—

♀ Head, neck all round, breast, sides of the body and abdomen, dark indigo-blue, mixed on the flanks with bright oil-green; the feathers covering the femora dull bluish-black; shoulders, upper part of back and upper wing-coverts, bronzy-green, the line of demarcation between this colour and the indigo-blue of the hind-neck being well marked and the blue along the line of junction somewhat intensified; lower

* *The Wyndham Farmer* says: "The specimen of the *Notornis mantelli*, or Takahe—the rare bird which was recently caught in the region of Lake Manapouri—has, we are glad to hear, been definitely secured for location in a colonial repository. It was purchased by Government for £250 the day after the House rose at the close of the late session, and is to be placed in the Dunedin Museum. An offer of £350 was made outside the colony, with a possibility of its 'rising' to £400; so the colony has secured the *rara avis* at a comparatively cheap price."

The foregoing paragraph relates of course to the last obtained specimen of *Notornis*. The price may seem high, but, after all, the values of extinct or all but extinct birds are necessarily fanciful, and will become more and more so. I met somewhere with the following remarks in illustration of this:—"The egg of the Great Auk, of which the sale was reported in *The Times Weekly* of 5th July, 1895, the great collection of postage stamps sold at about the same time, and the then current price of wheat. The egg was sold to the International Fur Store for £173 5s. The postage stamps were sold to Mr. Ferdinand Rothschild for £56,000. The current price of wheat was a little under 3s. 4d. per bushel. Thus the bushel of wheat bore an exchange ratio of $\frac{1}{1039}$th to the egg and of $\frac{1}{336000}$th to the postage stamps. This was expressedly the sum of £173 5s. as the price respectively of the egg and of 1,039 bushels of wheat, and of £56,000 as the price of the stamps and 336,000 bushels. On the other hand, the value of these several commodities to their respective buyers can only be gauged by the worth which each attached to his purchase for its usefulness in satisfying his needs or in giving him personal gratification."

part of back, rump, and upper tail-coverts of a beautiful bronzy-green, shaded with brown, the colours having a slightly wavy appearance and the surface of the plumage changing in certain lights; the outer primaries and their coverts intense indigo-blue, the inner primaries showing a little mixture of green; the scapulars of a rich bronzy-green changing to blue along the shafts; under surface of quills dull black; tail feathers dull bronzy-green; under tail-coverts pure white, forming a conspicuous tuft of broad, incurved feathers.

The specimen gave the following measurements:—Extreme length 22 in.; wing from flexure 10 in.; tail 4·75 in.; culmen (measuring from outer edge of frontal shield to tip of upper mandible) 3·25 in.; along the edge of lower mandible 2 in.; tarsus 3·5 in.; middle toe and claw 3·5 in.; hind toe and claw 1·5 in.

Obs. Although a comparatively young bird, the claws are much worn at the tips, indicating scratching habits on the part of this species. The bill, too, is a little worn and flaky towards the tip. The frontal shield measures 1 in. in its widest part, and extends three-quarters of an inch above the bill, the greatest depth of which is 1·75 in. As will be seen above, the middle toe is of the same length as the tarsus; the inner toe measures (with claw) 2·80 in. and the outer 2·75 in. The tarsus presents a series of twelve anterior scutes. The blue of the upper parts is least intense on the vertex and sides of the head, the plumage of these parts being in reality indigo-black. The bright colours change according to the point of view. Seen from the front, the blue takes on a lovely sapphire hue; looked at from behind it is duller, whilst the bronzy-green of the back is decidedly browner, and is without the metallic glint which characterizes it when viewed from the side. The irides are said to have been bright red in the bird when freshly killed.

This example does not exhibit the crescents on the wing coverts. As mounted, it is a fine, thickset, upstanding bird, Mr. Jennings having copied the attitude represented in the 'Birds of New Zealand.'

Professor Benham, with the fresh specimen before him, writes: "The colour of the beak is not uniform. The base is red, much more scarlet than in the pictures either of the first or second edition of Buller. Not only is the soft frontal plate red, but this colour extends along the upper surface of the horny beak itself for a distance of 1½ in.; also, down the sides, in front of the eye, to a distance of ½ in.; and along the lower jaw for nearly the same extent. Thus the whole base is bright red. This tint then fades into a dull reddish-pink, which extends to the tip; but immediately in front of the red base is a band of much paler pink, imperceptibly deepening in tone towards the tip. . . . On the foot and leg the scales are reddish-pink—the same colour as the greater part of the beak—without any trace of orange, such as is shown in the figure in the second edition, while the colour is a brighter red than in that of the first edition. . . .

"A comparison of the plate in the second edition with the bird itself, freshly killed, and with our oil-paintings, done from the Dresden specimen when it arrived in Dunedin, shows very considerable differences. The colour in the plate is not that rich indigo-blue characteristic of the bird when seen from in front, with the light well on it, but a dull greyish-blue, which does not do justice to the bird's beauty. The wings, again, are not uniformly green, but varied, as is correctly represented in the first edition. The long quills are dark-blue, like the breast, but scarcely so rich in tone; and the major coverts of the primaries are olive-green or, rather, bronzy-green, like the back. There is a broad band of the same tint across the base of the wing. Each individual quill has the lower part of the vane blue, its upper part brownish, or, in some lights, nearly black. The tail-feathers have not brown shafts nor are they dark brown below. I am here only calling attention to defects in the drawing, for nothing can be added to Buller's careful description beyond the expression of opinion that 'purplish-blue' does not seem to me quite the right term. I have called it 'indigo-blue,' as it appears to me that the colour is a pure rich blue."

In reference to this my artist, Mr. Keulemans, writes me: "The Professor is certainly wrong in calling it a rich indigo-blue, for indigo is a *dull*, not a *rich* blue. I think he should have said 'deep cobalt.' In fact, the proper name for that colour is peacock-blue, but this is a shop-name and scarcely admissible into scientific description."

Professor Benham continues: "With regard to the shape of the tarsi, these are not cylindrical, but laterally compressed. The account of the scales given in the text (second edition) does not agree with the figure. As a fact, the text is correct and the plate wrong. Each of the sides of the tarsus, as well as the front, is clothed with a series of transversely elongated scales, the three series being separated by a series of much smaller and more irregular ones, posteriorly and antero-laterally. I counted fourteen of these scales on the front series. . . . The shape of the wing is much less definite and less compact than would appear from the figure. It is, in reality, more rounded posteriorly as it lies against the body."

As to the colours of the soft parts, it must be remembered that both my description and Mr. Keuleman's drawing were taken from dried specimens in which the colours of these parts had in a great measure faded out. Professor Benham's minute description of the colours in the freshly killed bird, as well as his other criticisms, have been of the utmost value to my artist in completing a life-size picture of *Notornis* in oils, which now graces my collection and is, to my mind, a perfect masterpiece of art. Next to owning a specimen of the bird itself, the possession of such a picture is "a perpetual delight and a joy for ever."

The contents of the stomach of this last example of *Notornis* were submitted to Mr. G. M. Thompson, who had undertaken to examine the fragments of grass which formed the bulk of its food, and who afterwards made the following report: "It is almost certain that the bird has chiefly fed on species of *Carex* and *Uncinia* (cutting-grasses), and what strengthens this view is, that these plants are particularly common at the edge of the bush. . . . At the same time, there probably are some pieces of true grass among the *débris*, but I looked at over a score pieces, and they all belonged to the *Cyperaceous* type."

Mr. Hamilton, the Registrar of the Otago University, has kindly forwarded me an excellent photograph of the bird, as mounted, which has since appeared in several publications.

The above particulars were communicated by me to the Wellington Philosophical Society, at the time of the discovery, when I observed:—

"This reference to the rare *Notornis* naturally leads me to say a few words about our other vanishing forms of bird-life. And here, parenthetically, I may observe that perhaps I owe some sort of apology to the Society for so often dilating on this subject. But to me it is one of absorbing interest, and I have always in my mind Professor Newton's prophetic words. In the 'Encyclopedia Britannica' (p. 742) he writes: 'As a whole, the avifauna of New Zealand must be regarded as one of the most interesting and instructive in the world, and the inevitable doom which is awaiting its surviving members cannot but excite a lively interest in the minds of all ornithologists.' In another place he urges 'the importance of the closest study, because the avifauna is now being fast obliterated by colonisation and other agencies, and with it will pass into oblivion, unless faithfully recorded by the present generation, a page of the world's history full of scientific interest.' In his last publication, the 'Dictionary of Birds'—a book which should be on the shelf of every ornithologist—he returns to the subject (p. 316) with the following pregnant remarks: 'Mention has already been made of the unhappy fate which awaits the surviving members of the New Zealand fauna, and its inevitable end cannot but excite a lively regret in the minds of all ornithologists who care to know how things have grown. This regret is quite apart from all questions of sentiment; but, just as we lament our ignorance of the species which, in various lands, have been extirpated by our predecessors, so our posterity will want to know much more of the present avifauna of New Zealand than we can possibly record, for no one can pretend to predict the scope of investigation which will be required, and required in vain, by naturalists in that future when New Zealand may be one of the great nations of the earth.'

"For my own part, I am most anxious that we should escape the reproach of posterity by doing everything in our power to preserve, if not a few living representatives, at any rate a full life-history of these expiring forms; so I try to make my voice heard, in season and out of season, hoping thereby to stimulate others to do the same. I am induced to believe that, in the interests of science, I am pursuing the right course. For example, a returned colonist writes to me: 'At Cambridge I met the genial old Professor Newton, who told me that your sketches of vanishing native birds were the most charming he had ever read.' I naturally argue thus: that, if the subject possesses so much attraction for readers at a distance, I shall not weary my readers at home by reverting, on every opportunity, to this favourite theme. The great thing is to awaken public interest. And, if I may venture to say so, the subject is yours as much as mine, for it must be borne in mind that an implied duty rests on all the members of such a Society as this to contribute their quota to the general stock of human knowledge, and to aid—each one according to his opportunity and ability—in the promotion of such objects as the one I am discussing. It is refreshing to find, in these more enlightened days, that even from the pulpit this moral obligation is enforced, and with no uncertain voice. As an illustration of this, I may remind you of the eloquent sermon preached by the Bishop of Salisbury in St. Paul's Cathedral on the occasion of his visit to Wellington some time ago. Passing out of the beaten track, his Lordship referred to the interesting problems in science that awaited their solution in New Zealand, mentioning specially the abnormal features in the fauna and flora. He said, he hoped that in the City of Wellington—the centre of activity for the colony—there would be found men of leisure who would 'consecrate their lives' to the elucidation of these problems in natural science. He put in, too, a pathetic appeal for the beautiful virgin forest, and expressed an earnest hope that the hand of the destroyer would spare some portions of this magnificent bush, with its unique forms, and pass them down for the delight and study of future generations."

Professor Benham communicated to the Zoological Society of London a very valuable paper on the internal anatomy of Notornis, founded on an examination of the last captured specimen ('Proc. Zool. Soc.,' 1899, pp. 88-96).* He likewise wrote ('Trans. N. Z. Inst.,' vol. xxx., p. 147): "The colouration and measurements of the present specimen agree very closely with the account given by Sir Walter Buller, but the bird is rather smaller in all its dimensions; and as this specimen is a young female, the eggs of which do not exceed $\frac{1}{8}$ in. in diameter, we have every reason to believe that Buller's suggestion that the Dresden specimen was a female is correct. One of the skins in the British Museum is brighter in colouration and larger in size, and he presumes it to be that of the male bird, whilst the second British Museum specimen is also probably a female."

The capture of this fourth specimen of *Notornis* proved, according to the newspapers, one of the small sensations of the "silly season" in London, when Parliament is not sitting, and news is supposed to be scarce. One writer in *The Times*, weaving a web of romance around the occurrence, at long intervals, of "lingering representatives of a race which was co-existent with the mighty Moa," indulges in the hope that some day a pair of these birds may be captured alive and brought to Europe. Then other letters followed; and this correspondence brought to the front a Mr. E. W. Vaux, a former New Zealand resident, who averred that the *Notornis* was by no means so rare as was generally supposed,

* Professor Benham, in his interesting and valuable paper on this last example of *Notornis* (*l. c.*, p. 147), observes: "I may say that the plate representing *Notornis* in the new edition of 'The Birds' is not so accurate a representation of the colouring of the bird as the plate in the old edition, although from a lithographic point of view the former is a much better picture." He then, comparing his bird with the plate which was taken from the British Museum specimen, points out what he describes as "inaccuracies of drawing."

and that, "when in New Zealand in 1885, he knew a man (Docherty) who lived by himself in Dusky Sound for many years, and also others who had camped there, and was told that they had often heard the peculiar cry of the Takahe; in fact, to use the words of one, 'it could be heard every night.'"

This story of Docherty's facilities for collecting *Notornis* at one time gained currency in the colony and, knowing that the man was doing nothing, I wrote giving him an order for a pair of skins, for which I offered to pay £200, but stipulating that, if he undertook the hunt, he was only to be paid by results. In reply he wrote to me saying that he could not incur the risk of failure unless he had a sum of money paid down, to be accounted for *if he got the birds*. It may be gathered from this how much truth there was in his story of hearing its cry every night!

At the same time I have no doubt, in my own mind, that the bird still exists—and possibly in considerable numbers—in the swampy region which it inhabits, much of which is, as yet, unexplored.

Mr. Russell, junior, of Invercargill, solicitor, assured me, in 1890, that one had been seen on the edge of the Hauroto Lake, near Te Anau, skulking in the low vegetation. It came down to the water's edge and then quietly walked away.

The last specimen procured was a young female, and the ovary contained a bunch of undeveloped eggs, all tending to show the perpetuation of the race.

The importance of our having secured this further example of *Notornis*, for careful anatomical examination, cannot be over-estimated, seeing that — although a species* once existed in Norfolk Island and on Lord Howe Island—one may safely conclude that no member of the genus is now to be found in any other part of the world.

Anything relating to this bird possesses now exceptional interest. It is curious to find

* In the 'Ibis' for 1866 (p. 159), the editor, Professor Newton, writing of this bird, says: "We only know of two specimens still existing, one at Vienna, obtained from the Leverian Museum, the other in the Derby Museum, at Liverpool, from Bullock's collection. It would be very interesting to know if the bird is still found on either of the islands named, and we trust our ornithological friends at the Antipodes will endeavour to ascertain the fact. It is the *Gallinula alba* of Latham."

The bird figured by Von Pelzeln, as now preserved in Vienna, is undoubtedly a true *Notornis*.

Mr. Salvin writes ('Ibis,' 1873, p. 295): "In a former number of the 'Ibis' for the current year (*antea*, p. 45) I referred to a plate which I was having prepared from a coloured drawing sent to me by Herr Von Pelzeln of the typical specimen of the *Fulica alba* of White. This plate (Pl. X.) is now given herewith. On comparing the coloured drawing with the specimens in the British Museum, it appeared evident that the bird in the Imperial Cabinet at Vienna must belong to *Notornis*. The short wings and the short toes, as well as the outline of the beak, indicated clearly a far greater generic affinity with *Notornis* than with *Porphyrio*."

In a letter on 'Lord Howe Island' (P.Z.S., 1869, p. 471), Dr. G. Bennett says that an adult Gallinule figured in Philipp's 'Voyage to Botany Bay,' and found only in Norfolk Island and Lord Howe Island, is now presumably extinct, not having been seen recently on either of these islands. (See also Etheridge's Report, Aus. Mus. Mem. ii., pp. 10-11.)

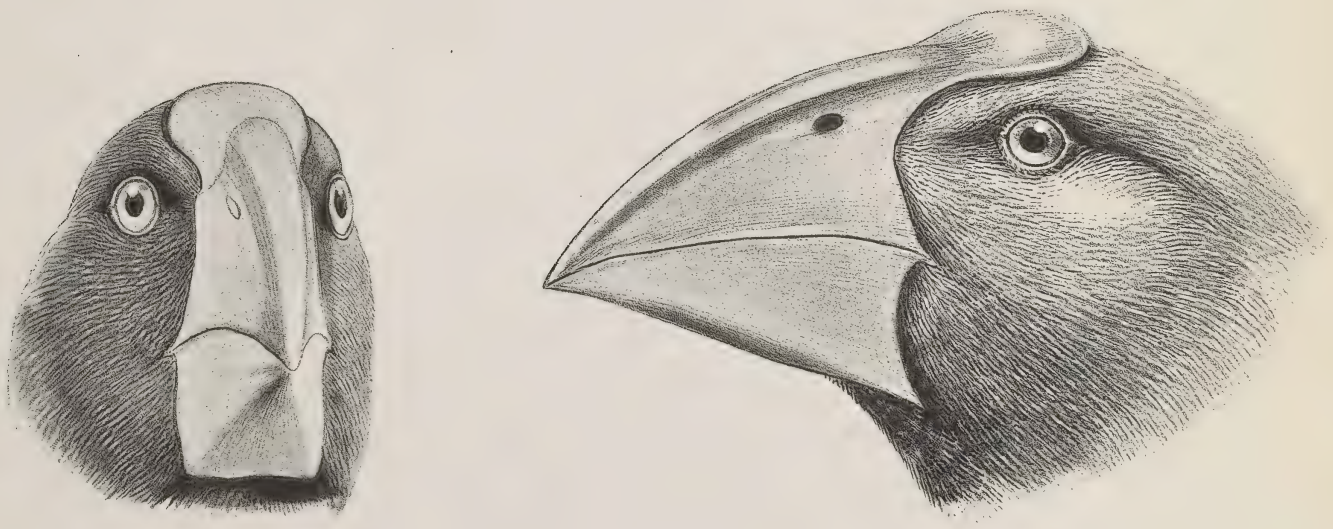
Dr. Ramsay, in his 'Notes on the Zoology of Lord Howe Island' (*Proc. Linn. Soc., N.S.W.*, 1883, p. 86), writes that this bird "appears to have been first mentioned by Callam in 1783, and afterwards in Philipp's 'Voyage to Botany Bay,' 1789, p. 160, and again, under the name of *Gallinula alba*, by White, in his 'Voyage to New South Wales,' 1790, p. 238." And he adds: "During the last three years I have made every exertion, through the settlers on the island, to ascertain if this bird still exists there, but without effect. On one occasion 'Red Bills' were represented to me by Captain Armstrong as having been seen on the hillside but, on my correspondent sending there, nothing was heard or seen of them. The only other large land-bird known, and which still exists on the island, is the 'Wood-hen,' *Ocydromus sylvestris*, of which I have recently seen specimens, but this species also is becoming extinct, being easily captured or killed."

Dr. Forbes kindly showed me the specimen in the Liverpool Museum, and it is without doubt an albino *Porphyrio melanonotus* (not a *Notornis*) showing vestiges of the normal plumage.

Mr. Dawson Rowley, in his *Ornithological Miscellany*, vol. i., p. 37, properly distinguishes this bird from *Notornis*, but treats it as a distinct species, under the name of *Porphyrio stanleyi*.

the following reference to its haunts in Canon Stack's history of the now extinct Ngatimamoe tribe of Maoris: "A party [of Ngaitahu] had been sent from Pukekura to Rauone to collect fern-root. One of them, Tane-toro-tika, the son of Taoka and grandson of Manawa, a young chief of very high rank, was surprised and taken prisoner. On being carried to the presence of Te Maui, that chief, seeing him, said: 'This comb-fastening is equal to that comb-fastening,' meaning that the captive's rank corresponded to that of the chief whose remains had been desecrated, and thereupon killed him. Taikawa, a Ngaitahu warrior, immediately after the deed, came upon the band of Ngatimamoe, and asked them what had become of their prisoner. When told that they had killed him, he said: 'You have done foolishly, for not a soul of you will now be spared. You will be banished to the haunts of the Moho (*Notornis*), and in the depths of the forest will be your only place of safety.'" Taikawa's words were prophetic, for notwithstanding the persistent rumours of wild men in the woods of the west coast, the capture of a Ngatimamoe would be a greater event even than the killing of a *Notornis!*

As this bird has of late attracted so much public attention, and may at any moment be met with again in the South Island, I think I cannot do better than reproduce here the woodcuts of its head which appeared in my Introduction (vol. i., p. lxxv.).



HEAD OF NOTORNIS MANTELLI—TWO ASPECTS.

FULICA AUSTRALIS.

(AUSTRALIAN COOT.)

Fulica australis, Gould, P.Z.S., 1845, p. 2.

I have to add to the list of New Zealand birds the Australian Coot, a specimen of which was killed, in July, 1889, at Lake Waihora, in the provincial district of Otago, and the body sent, in the flesh, by Mr. R. Ramage to the Dunedin Museum. There is no record of this species having been brought alive from Australia and, even if it had been, it is difficult to see how it could have reached that remote district. It is the only New Zealand-killed specimen at present known; but the habits of the bird are recluse, and it is not improbable that many more exist in the swamps and sedges of the interior. This particular bird (which is carefully preserved in the Museum) proved to be a female. I had an opportunity of examining it on my last visit, and made the following descriptive notes:—

Adult ♀. Entire plumage slaty-black, greyer on the under-parts, and especially on the lower abdomen; primaries and secondaries greyish-brown, the latter greyish-white at the tips. Irides bright red; bill and frontal shield blackish-green, the points of both mandibles horn-coloured; legs and toes black (in the dried specimen). The toes are beautifully palmated or lobed; there are three expansions on the middle and outer toes, and two on the inner. Approximate length, 13 inches; wing from flexure, 7; tail, 1·75; bill, measuring from top of shield to the tip, 1·5, along the edge of lower mandible, 1·1; tarsus, 2; middle toe and claw, 3; widest part of lobed expansion, ·75.

Mr. Gould states that in Australia its favourite places of resort are the inland waters of the country, which the bird seldom quits, unless to seek for a more abundant supply of food, consisting of aquatic insects, small-shelled mollusks, &c. Like the European Coot, it constructs a floating nest of dried aquatic plants, upon which it deposits its eggs and rears its young..

(?) FULICA NOVÆ-ZEALANDIÆ.

(COLENSO'S COOT.)

Fulica novæ-zealandiæ, Colenso, Tasm. Journ. of Nat. Science, 1845.

As far back as 1845 the Rev. Mr. Colenso, one of the most conscientious and accurate naturalists the Colony ever possessed, made the following entry in his diary:—

A little below Ngaruawahia (on the Waikato River) we met a man in a canoe with a live and elegant specimen of the genus *Fulica*. I hailed the man and purchased the bird, which he had recently snared, for a little tobacco. It was a most graceful creature, and, as far as I am aware, an entirely new and undescribed species. Its general colour was dark, almost black; head grey, and without a frontal shield; fore-neck and breast ferruginous red; wings barred with white; bill produced and sharp; feet and legs glossy olive; toes beautifully and largely festooned at the edges; eye light coloured and very animated. It was very fierce and never ceased attempting to bite at everything within its reach. I kept it until we landed, intending to preserve it, but as it was late I let it go. It swam, dived and disappeared. Not a doubt, in my opinion, can exist as to its being naturally allied in habit and affinity to the *Fulicæ*; I have therefore named it *Fulica novæ zealandiæ*. In size it was somewhat less than our European species, *F. atra*.

In the 'Birds of New Zealand' (vol. ii., p. 140) I relegated this bird to a footnote; but it has been introduced into Dr. Sharpe's 'Handlist'; and, although the species has not, so far as is known, been met with since, the description is so clear that I think it may fairly be admitted into our recognised list of species.

PODICEPS RUFIPECTUS.

(NEW ZEALAND DABCHICK.)

Podiceps rufipectus, Gray; **Buller, Birds of New Zealand, vol. ii., p. 280.**

This interesting little bird is still numerous on the lagoons of the west coast of the Wellington provincial district, where, indeed, it appears to be increasing. The pairing season commences in September, and the birds become then very noisy, chattering to each other across the water all day long. At this season it is very amusing to witness the amorous gambols on the water of these otherwise sedate swimmers, with their backs arched and feathers puffed out, splashing about and chasing each other in the wildest state of excitement.

This is one of the most interesting inhabitants of the Papaitonga Lake, where it is extremely plentiful, as the result of close protection. It is interesting to hear these birds on the lake, in the breeding season, "scolding" each other and keeping up a loud confabulation. A pair brought out their brood of five about the 15th of December. It was very pretty to observe one of the old birds swimming over the smooth water followed by her little crowd of young ones, and then detaching herself for a time to gambol with her mate, and to skim the surface of the water, apparently in the height of playful enjoyment.

This bird is called "Taihoropi" by the Ngapuhi tribe, "Weweia" by the Rotorua natives, and "Taratitomoho" in the Waikato.

Nestling. Covered with short, thick-set down, yellowish-white on the upper surface, with a broad longitudinal streak of blackish-brown extending the whole length of the body. This marking reappears on the sides of the body, but is not continuous, being broken in the middle.

LOPHÆTHYIA CRISTATA.

(GREAT CRESTED GREBE.)

Podiceps cristatus, Linn.; **Buller, Birds of New Zealand, vol. ii., p. 283.**

In the Museum at Invercargill there is a crested Grebe in full plumage, with a very full ruff, of a dark chestnut colour, with black tips, and with a double occipital crest of lanceolate, black feathers.

As already stated (vol. ii., p. 285), I have received several specimens from Waikare-iti Lake in the North Island. This is the bird referred to as the 'Kaaha' by Mr. Elsdon Best in his 'Sketches from Tuhoeland'; and the account of the floating nest (strange as it appeared to him) is perfectly natural:—

> Another bird which has become extinct is the Kaaha, which formerly frequented Lake Waikare-iti, a very beautiful, but little known lake, situated on the ranges between Waikare-moana and Mount Manuhoa. It is

said to have been a large bird and a good diver (he manu ruku roa), also that it built its nest upon the waters, and anchored the same to the bed of the lake, so that it ever floated and swayed to and fro. Certainly the waters are shallow and the lake well sheltered—still, it is a large order.

Mr. Roberts, Government Surveyor, told me that one of his men on the survey party, after pursuing a Crested Grebe in his boat for half an hour, and firing several shots, finally killed it. On taking it up he found, hidden under the stiff scapulars, a downy chick, alive and unhurt. The devoted parent had thus carried its young, swimming and diving with it during the long pursuit.

This bird is so well known in Europe that I need not dwell upon its attractiveness as a fresh-water swimmer. In New Zealand it has always been a rare species, and I have known a stuffed specimen sold for as much as £5. It is rigidly protected by the Government, but I am glad to say that, with the kind assistance of Mr. Justice Chapman, I have been fortunate enough to obtain an official "permit" to take a live pair from the South Island for the purpose of placing them on the Papaitonga Lake, where they are likely to establish themselves in perpetuity, breeding freely among the raupo and sedges, and always protected against molestation of any kind. A more ideal home for such birds could scarcely be imagined; and it will be interesting to have this species associated on the same waters with the native Dabchick, which is so plentiful there.

In illustration of the subject, I reproduce here one of my daughter's beautiful photographs of New Zealand scenery.

PAPAITONGA LAKE: WESTERN ARM.

APTENODYTES PATAGONICA.

(KING PENGUIN.)

Aptenodytes longirostris, Scop.; **Buller, Birds of New Zealand, vol. ii., p. 306.**

The Penguins, as a family, are noted for their ferocity, snapping and biting in a very determined manner when interfered with or handled. The King Penguin, however, notwithstanding its great size and its power of muscle, is one of the gentlest of birds. On being captured they naturally struggle to escape, and sometimes utter a peculiar guttural cry; but in confinement they immediately become quite tame and tractable. Although armed with a powerful bill they never use it for offensive purposes. They submit to being stroked on the head and back without showing even a sign of impatience and, when an attempt is made to handle them, they merely parry the intrusive hand with their long flippers, and in the gentlest manner. Captain Fairchild, on one occasion, brought me four fine adult birds and a nestling from the Macquarie Islands. One of the former went immediately to the dissecting-room. The others I turned loose in the garden, together with a large contingent of *Catarrhactes sclateri* and *C. schlegeli*. The latter scuttled off and took refuge in the shrubbery; but the three King Penguins remained on the grass slope, and made themselves perfectly at home at once. Owing to their peculiar conformation they do not rest in a squatting attitude like the other Penguins, but either sit bolt upright, resting the whole weight of the body on the heel of the foot, or lie full length on the ground. In the early morning I found them lying prone on the belly, with their heads meeting and crossing one another. They remained in this position and perfectly motionless till the sun was well up in the heavens. On two of these birds being removed, the remaining one appeared quite disconsolate, and wandered over the place for a whole morning, looking for his mates. He stalked about in the drollest manner, walking perfectly upright and swaying his outstretched flippers, for the purpose of steadying the body. Having failed to find his companions, he settled down in the most philosophic fashion, and never left that corner of the garden where he had taken up his abode. He would not take food when offered, but on my forcing open his mandibles and placing minced raw meat in his mouth, he swallowed it with avidity.

The nestling is covered with thick woolly down of a uniform sooty colour. It is a voracious feeder, uttering all day long a shrill squirling cry and opening its beak to be fed. Its appetite appears to have no limit, for no sooner has it swallowed one handful of minced meat than it stretches up its neck and clamours for more. When calling for food it sways its neck to and fro, after the manner of a young Cormorant, as if to give greater emphasis to its demands. When alarmed the King Penguin utters a low cry like that of a domestic Goose.

The nearest point at which this Penguin can be obtained is Macquarie Island, lying about lat. 55° S. There is a tradition, however, on board the 'Hinemoa,' of one having been seen, among a group of Crested Penguins, on Campbell Island. It was made out with the glass long before the ship came alongside. It is not unlikely, however, that this was a bird that had made its escape from one of the sealing ships on its way from Macquarie Island.

The bird of the first year is covered with a shaggy, hair-like down of a yellowish-brown colour. This is gradually replaced by short plumage, presenting the colours of the adult, but much duller. The spatulate marks on the side of the head are of a pale greenish-yellow colour, and on the breast there is at first only a tinge of yellow, where in later life this colour becomes so pronounced. The young birds are phenomenally fat.

In connection with the above remarks, on the extremely gentle nature of my captives, the following note by Dr. Kidder is worth reproducing; for his experience with one bird, at least, on Kerguelen's Land appears to have been different. He says: "The first specimens of this Penguin found near our station were met with on the beach on the 26th November, having apparently just come out of the water. There was but a single pair, both of which were secured, one being brought home alive. The other fought so fiercely that I had to kill him to get him home. . . . I endeavoured to keep the other alive, tying it up on the beach with a good long line to its leg. It would spend a large part of every day, at the end of its line, splashing in the water. It finally entangled itself in the seaweed near the bottom, and was drowned during the night. It slept bolt upright, balanced on its heels, swaying back and forth as it breathed, and snoring heavily. The neck is very extensible, so much so that the bird can stand at least a foot taller when excited than when at rest. It will frequently remain for twelve hours standing in the same place, and seems to me to be in every way a stupider bird than either *Pygoscelis* or *Eudyptes*. When thrown down it raises itself by aid of its beak, pressing the point against a stone. . . . Captain Fuller, of the schooner 'Roswell King,' informs me that they build no nests whatever, carrying the egg about in a pouch between the legs, and only laying it down for the purpose of changing it from male to female. The pouch, if there is one, can be no more than a fold of the skin, since none was noticed in skinning or measuring the specimens."

In my account of this species (vol ii., pp. 306, 307) I omited to mention, on the authority of Professor Hutton, that a live one was taken in 1878 on the coast at Moeraki, and forwarded to the Otago Museum.

There is in my son's collection a pure albino King Penguin, without a speck of colour; bill white on the culmen, yellow on the sides; feet yellow, with white claws.

The young of the second year differs from the adult in having the corniform occipito-lateral markings detached from the yellow of the foreneck, and these as well as the latter, instead of being bright yellow, have only a wash of pale lemon-yellow on a white ground. The green velvety sheen, so conspicuous in the adult, is absent from the head and throat, these parts being dull black. The plumage of the upper parts is darker and lacks much of the slaty-blue hue which characterises the adult.

The examination of a series of eight eggs gave me the following result: They exhibit much variety in size and shape; the typical form is pear-shaped, but sometimes they are elongate, inclining to an elliptical form, with an attenuated smaller end. The largest of the former in this series measures 4·1 in. by 3 in.; and the smallest of the latter measures 4·1 in. by 2·7 in.

In the *Pall Mall Magazine* of November, 1897, there appeared an interesting article from the pen of Mr. W. H. Bickerton, under the title of 'The Home of the Penguins of the World,' giving a picturesque account of a visit to Macquarie Island, accompanied by photographs of his own, one of which I have permission to reproduce. From his narrative I extract the following paragraphs:—

In the far Southern Pacific there lies an island whose shores are lined with millions upon millions of strange and uncouth birds. This land, with its outstretching reefs, its sullen skies and pitiless seas, is their home, and here the story of their lives is enacted.

One sunny day in February, 1895, we jumped on board the hundred-ton ketch 'Gratitude,' lying at anchor in Bluff Harbour, New Zealand, and set sail for a two months' voyage in the almost unexplored waters of the South Pacific Ocean. Our destination was the Macquarie Islands; and, after fighting with contrary winds and equinoctial gales for twenty-eight days, the islands were sighted in the early morning. These islands, looking mere specks on the mariners' charts, lie in about latitude 55° S. and longitude 155° E. Although spoken of in the plural number, there is practically only one island—a range of hills starting almost straight out of the sea, with coarse tussocks covering the sides, and lakes of snow water on the tops. It is thirty miles

long, and varies from three to seven across; at each end there is a small detached group of rocks—hence the name 'Macquarie Islands.'

The awkward point about the island is that there are no harbours round it, and the rocky reefs stretch far out to sea. Immediately there is a breeze the water is beaten against the reefs into a tremendous line of surf close inshore, with white masses swirling over hidden rocks farther out. The ship has to anchor beyond these rocks, and so gets very little shelter from the island. When the weather is too rough the craft puts out to sea for safety, as the anchorage bottom, being composed of shingle which shifts with every tide, renders it liable for ships at anchor to drift on to the rocks.

On one occasion our ship was blown so far to leeward that it took five days to regain the island, and we who had been left were very much relieved to see it heave in sight again.

All landing is carried on in whale-boats, with thick rope bound round their gunwales, to save them from being damaged by the constant bumping against the sharp rocks.

When we first arrived, the men who had been left on the island for three months to obtain penguin-oil were so anxious for news, tobacco, and rum, that they put off in a terrific sea, and from the ship it looked as if they must capsize before they could reach us. Sometimes they were completely out of sight in the trough of a roller, and then could be seen again for a moment on the top; when at last they did arrive alongside, the boat was half full of water, and two of the crew were hard at work baling.

The men stopped on board until the afternoon, and then, as the sea had gone down considerably, it was decided that they should go back the same day. Off they started, cheered and refreshed in mind and body with home news and grog. They seemed to get on all right until they were landing, but then they were all thrown out, and the boat landed bottom upwards on the beach. We heard afterwards that only one man was hurt—a sprained wrist; the steer-oar was lost, but washed up next day on the kelp. . . .

There is only one breeding 'rookery' of King Penguins on Macquarie Island, the birds being comparatively rare. The breeding season extends over a considerable period, as they do not all begin to lay at the same date. The first birds lay in October, but in March considerable numbers are still hatching. The month of March is, perhaps, the most interesting time of the year to study the habits and customs of the King Penguins, for at this date we found them in all stages of growth. There were eggs still being hatched, little ones just out of the shell, with nothing on but a coat of black leather-like skin, and a few hairs sprinkled about which couldn't be called down yet. Then there were young ones nearly the size of their parents, looking more like quadrupeds than birds, with a thick coating of brown fluffy stuff similar to opossum fur, which when wet causes the youngsters to look like brown retriever pups, with masses of curly locks clinging to them. Whenever I saw these young ones, I felt a desire to take them up and stroke them—they looked so soft and warm.

The freezing winds seem to have no effect on their happiness—they whistle away and keep warm on the coldest and wettest of days. Young King Penguins remain with their parents for about nine months, and all this time they have to be fed, not being able to go to sea until they get their first coat of true feathers.

As it takes nearly a year to get fledged, it is quite an undertaking for 'Kings' to bring up their children, and so it is fortunate for the female that both parents help in the family duties. They take turns in going out to sea to fish, one always staying in the 'rookery' attending to the youngsters.

When a young 'King' is hungry it cries out in a whistling voice, and the parent who is with it at the time bends down its neck and enables the little one to put its head right up, and obtain food from somewhere inside. I saw the heads of the small ones completely disappear for the time in the parental neck.

King Penguins, like the 'Royals,' have only one egg. They have no nest whatever, and manage the hatching in a most wonderful manner. The egg is placed on the two feet, and then the bird, taking up a stooping position, loosens the skin on the breast. This looseness is utilised to form a sort of pouch, completely covering the egg. By this means the egg never touches the cold stones, and is warmly covered up all round.

The grip which the parents have of the egg is surprising, and although a party of us walked through the 'rookery' and scattered the birds on all sides they never let their egg go, and none were seen lying on the ground behind. It was truly astonishing to see the ease with which the brooding birds hopped about, always retaining their egg, and in some cases the newly-hatched chicks.

When the young are very little they are always kept in this pouch; but as they grow larger only half of the body can be covered at a time; and then only the head; finally, when they are too large to be covered at all, they have become strong enough to face the cold winds, and can be seen on all sides standing up, with the parent in front shielding them a little from the blast. These young birds become so fat and big that it looks as if they should be taking care of their parents, instead of being tended themselves.

In the 'rookery' the birds stand a little apart from one another, and there is just room for the continual going and coming of the parents with food. If one of the hatching birds moves too much and comes near another parent, the two fight fiercely until one moves away out of reach. King Penguins use their flippers almost entirely for fighting, the beaks playing a very small part in encounters.

There seems to be a natural system for preventing the little ones from getting lost in the 'rookery.' As every parent pecks a wandering one directly it comes within range, the chicken soon realises that there is only one spot on earth safe for him, and that is with his own mother—so he promptly turns back and is gathered up again into the loving folds of her pouch. . . .

KING PENGUIN HATCHING ITS EGG.

When they are hungry they go out to sea to fish, and owing to the never-ending appetites of countless Penguins, they have to go a long distance away. Watching from the shore, these birds can be seen returning far away on the crest of a wave, where they are just distinguishable by the white dots of surf they make in swimming. Their swimming is so swift, that the next minute they are among the breakers, and landing and shaking themselves at our feet.

All Penguins have the same ingenious method of tackling the heavy seas which are always to be found on these coasts. They keep looking round, and as the wave is about to break over them, they face it and dive under, in time to avoid being knocked dizzy by the falling water.

The bump of curiosity is strongly developed in 'Kings,' and when we were in the hut they came right up to the low windows and peered eagerly in, tapping the glass with their beaks as they did so.

I found this curiosity a great trouble when photographing them on the beach, as no sooner had I got the camera fixed than they would march straight up and bump, or peck its legs. The only method of getting them into focus was to wave the camera cloth violently in the air and shout and rush excitedly towards them; this noise and fuss used to frighten them a little, so that there would be just time for me to get back and expose before they reached the camera once more.

If there is a wind blowing they spread out their wings to balance themselves as they walk, but when it is calm, or they are standing still, the wings are held straight down at their sides, and they look like a regiment of soldiers shouldering arms.

When I see one of these birds standing alone, he reminds me of a gentleman in a dress suit, the dark feathers at the back coming right down and looking like the coat-tails, and the white breast in front the waistcoat.

These birds look their best when mating, and put on airs and styles which nothing but a King Penguin could carry without looking ridiculous. They swell out their breasts, and wobble about from side to side as they wander around with their 'intendeds'; every now and then stopping and looking slyly round to see if their blandishments are having the proper effect.

If a female is especially attractive, and her charms prove sufficient to please another beau in addition to her established lover, a fight is started by the outsider calmly walking up to claim possession, entirely ignoring the other male, until he enforces the fact of his presence by his powerful wing strokes. Then the two males set to and fight it out, she remaining an interested and critical spectator, until one or the other of the combatants seems to be winning. Then, unable to contain herself any longer, she rushes into the fray, and, siding with the victor, completely outmatches the other. It matters not to her if the loser is her former suitor, as she is only too glad to be consoled by the winning stranger, feeling that she has a better protector in case of need.

The one-year-old birds have black beaks, but these change to a dark rich orange as they become older. The young ones do not seem to be so firm on their feet as the older birds, for when we chased them suddenly they nearly always fell down upon their breasts, and used their wings as a sort of oar with which to propel themselves; in this position they slid along the ground quite quickly, making us run to overtake them.

With the older birds it is comparatively rare to see them in any other position than upright, and even when sleeping they do not lie down.

It was great fun to come up quietly to a sleeping 'King,' and touch him lightly with one's foot; he was sure to fall flat on his back, and stare up at his tormentor in a dazed manner; then, collecting his faculties together, he would scuttle away as quickly as he could, never stopping until a safe distance had been placed between himself and his foe. The birds always seemed to be more scared by this simple trick than by anything else we could do to them.

All day the beach is thronged with Penguins, walking or standing about in groups, apparently talking. Sometimes two Penguins talking together are joined by a third, who gives them the benefit of his experiences; and then, when the talk is over, the new-comer walks off again to hear and spread news with other Penguins.

Parent Penguins can always be distinguished from the others by the fearfully solemn and business-like manner with which they walk along the beach, never stopping or looking round, but going straight ahead. I saw one with his head bent forward and his wings spread out, planting his feet down in such a determined manner that it struck me he must really be sorry to have to take them up again to walk. His mind was so full of his duty that the only effect of my standing in his way was to turn him slightly aside, his wings brushing against me as he passed.

Returning home, the parents behave in much the same manner; only, owing to the internal load of fish they are carrying, they are not quite so steady on their feet. They are also in more hurry, perhaps fearing that the little one's appetite has exceeded its supply.

It is wonderful how fat the parents keep the young, the almost mature ones weighing much more than the old birds; so fat do they become that they are killed in thousands for boiling down into oil.

As soon as the young one is fledged and able to take care of itself, the parents leave it and go out to sea to feed on fish, and become fat enough to enable them to stay three weeks moulting, without food, Penguins being unable to go fishing while the feathers are changing.

Penguins swim like porpoises, diving a little below the water, and then leaping up into the air to

take another dive, and so they progress. As they passed the ship for the first time, I thought they were a school of young porpoises; but the captain laughed and pointed to some Penguins resting on the waves,—not till then did I discover my mistake. Soon the ship was surrounded by the birds, who, in their anxiety to fathom the mystery of the strange creature who had invaded their territories, lifted themselves almost out of the water. Penguins are seen hundreds of miles from land but, through their tremendous swimming powers, they are as much or more at home there, than they are on land.

When one sees the calmness with which these Penguins go about their ordinary occupations, even when we are among them, one feels that if they have the germs of fear in their composition they certainly do not cultivate or allow it to appear except on rare occasions, as when we tip them over in their sleep.

Never while I was on the island with these birds around me did the time drag heavily away, and I cannot but feel that this was mainly due to the interest (one almost says companionship) of the Penguins. Although totally dissimilar to human beings, there was something in their grouping while apparently exchanging ideas which affected me strangely, and reminded me of knots of men.

Perhaps it is this impression of similarity which has led me to write about them more as if they were a nation of people than a mass of multitudinous birds fulfilling nature's laws.

The climbing power of Royal Penguins (*C. schlegeli*) is extraordinary, and with the aid of their sharp curved nails they are able to scale steep clay cliffs one and two hundred feet high.

Although the Royal Penguins are in such numbers, yet I think the King Penguins (*Aptenodytes patagonica*) are the most interesting, and I never tired of standing about in the midst of them, watching their curious habits, and trying to understand the meaning of their seemingly inexplicable motions.

Perhaps the most important point in connection with King Penguins is the fact of their not being migratory, like the other species on the island; it is therefore possible to study them in much greater detail and to obtain reliable information as to their habits, in all stages of growth.

'Kings' are the tallest of all Penguins [except the Emperor Penguin], being about three feet six inches in height. They appear to vary in height, but this is only due to the elasticity of their necks, which are sometimes stretched to their fullest extent, and at other times are drawn down.

The following very interesting account of the moulting of the King Penguin in the Zoological Society's Gardens is given by Mr. E. W. De Winton in the 'Proceedings' for 1898 (pp. 900-902):—

In the latter part of July, before any feathers were shed, it was obvious that the bird was looking very 'seedy'—in fact, sickening for moult. The feathers of all parts lost their lustre, the colour of the beak faded, and the head became grey, as if half of the feathers were wanting; but this I do not think was the case. The bird did not go into the water, and sat moping with half-closed eyes. It ceased to call in its loud manner and to put itself into the usual ludicrous attitudes. This state of things went on for some weeks, but it was not noticed that any feathers were shed until the latter part of August. The keeper tells me that the feathers of the tail were the first to come out, and I saw the bird removing the feathers of the upper and lower tail-coverts in the first week of September. About this time there was a very observable change in the appearance of the bird—the colour had almost entirely gone from the patch at the base of the lower mandible, and, instead of the clear orange colour, this patch appeared to be of a pale horn-colour. The feathers of the back and wings became as brown as withered leaves, so that the bird looked as if it were covered with mud; there was a triangular space on the throat or lower neck where the larger breast-feathers were commencing to fall; this space was never naked, but covered thickly with very short feathers, so that there was only a deep dent in the plumage which increased daily in size. From this time the bird was always very busy picking its feathers off; nearly all of them were removed by its bill, not pulled but pushed off; and there was no general peeling-off in large masses, as is described by Mr. Bartlett in the case of the other species.

When the moult was nearly completed, and only a few dried-up feathers adhered to the back and upper-side of the middle of the wings, the epidermal covering of the orange-coloured patches on the lower mandibles loosened and came off like pieces of parchment or dry bladder. By the third week of September the bird was in perfectly fresh plumage; it was constantly to be seen in the water lying for hours on the surface spread-eagled, which is a very favourite attitude. One week afterwards its feathers seemed full-grown, the colours perfectly fresh and bright, and it constantly crowed in its well-known way, especially towards the evening.

PYGOSCELIS PAPUA.

(ROCK-HOPPER.)

Pygoscelis tæniatus, Peale; **Buller, Birds of New Zealand, vol. ii., p. 304.**

My first authority for including this Penguin among the birds of this country was a pair in the Otago Museum, obtained from Macquarie Islands, where this bird is said to be comparatively plentiful. I afterwards received a pair of skins (♂ and ♀) from the same locality.

Dr. Kidder found it very abundant on Kerguelen Island. He writes: "Two or three of the birds were captured by the boat's crew, which went on shore after the eggs, and brought back to the ship, where they created a good deal of amusement. When walking away from the spectator, swaying from side to side, with flippers hanging well away from the body, they have a ridiculous resemblance to small children just beginning to walk, who have put on overcoats much too long for them. . . . No living thing that I ever saw expresses so graphically a state of hurry as a Penguin when trying to escape. Its neck is stretched out, flippers whirring like the sails of a windmill, and body wagging from side to side, as its short legs make stumbling and frantic efforts to get over the ground. There is such an expression of anxiety written all over the bird; it picks itself up from every fall, and stumbles again, with such an air of having an armful of bundles, that it escapes capture quite as often by the laughter of the pursuer as by its own really considerable speed. On the 3rd of December, about the time of hatching, I observed a school of these Penguins progressing by leaps clear of the water; one following another in so rapid succession that two or three were always in the air, and with a motion so like that of porpoises that I at first took them for those marine mammals. In the water, indeed, all awkwardness at once disappears, their speed in swimming being almost incredible, and surpassing, of course, that of the fish upon which they feed. On the 4th of December I found one young Penguin just hatched, and three more still in the eggs, which they had broken with their beaks. The young are covered with soft, hairy, pearl-grey down; head black, above and behind."

CATARRHACTES CHRYSOCOME.

(TUFTED PENGUIN.)

Eudyptes chrysocome. Forster; **Buller, Birds of New Zealand, vol. ii., p. 290.**

I am able now to add to my account of this species a description of the nestling from a specimen obtained at Dusky Sound:—Head, throat, hind-neck, and upper parts—that is to say, the surface that is coloured in the adult—covered with short sooty-black down, and the under-parts with short white down; bill whitish-horn colour; feet pale-brown.

In a more advanced chick—which is double the size of that already described—the down is even shorter, as if rubbed off, and the root-points of future feathers are disclosed, covering the surface in regular lines or series.

The young of this species differs from the adult in being appreciably smaller in size, and in having a whitish-grey throat; the long crests are absent, being represented by a tuft of feathers little more than half an inch in length, commencing immediately above the eyes and extending back one and half inches towards the occiput, and being pale lemon-yellow, with blue tips. Bill black, with reddish-brown tips.

A very young bird in my possession has the chin and throat pale slaty-grey, much mottled with black, and a very narrow streak of yellow over the eyes, showing incipient crests.

Catarrhactes chrysocome, in the adult state, is readily distinguishable from the other Penguins by its full crest of lengthened yellow feathers and its red eyes. But ten brought to me by the 'Hinemoa,' on the 25th February, were all birds of the first year, in which the crest was not yet developed. I am assured by the second engineer (who is a collector of birds) that this species always lays two eggs, whereas *C. sclateri* lays only one.

Writing of one of this family, Mr. Gould says: "Its powers of progression in the deep are truly astonishing. It bounds through this element like a porpoise, and uses its short fin-like wings as well as its feet to assist it in its progress; its swimming powers are, in fact, so great that it stems the waves of the most turbulent seas with the utmost facility, and during the severest gale descends to the bottom, where, among beautiful beds of coral and forests of seaweed, it paddles about in search of crustaceans, small fish, and marine vegetables, all of which kinds of food were found in the stomachs of those I dissected. A considerable portion of the year is occupied in the process of breeding and rearing the young, in consequence of its being necessary that their progeny should acquire sufficient vigour to resist the raging of that element on which they are destined to dwell, and which I believe *they never again leave, till they in turn seek the land for the purpose of reproduction.*"

A singular confirmation of Mr. Gould's view is supplied by the dried specimen of a Penguin's foot (belonging, I believe, to the above-named species) which I exhibited at a meeting of the Wellington Philosophical Society.* Through long-continued immersion in sea-water a number of barnacles had become firmly attached to the end of the toes. The other foot was similarly attacked, but was in a worse condition, the irritation set up by the foreign growth having caused the claws to come off, leaving the extremities sore and diseased. An occasional resort to land, with the incidental friction or wear-and-tear, would of course have rendered such a condition of foot as this impossible.

In the Museum at Brussels a specimen of this species, wrongly labelled *E. chrysolophus*, has an abundant frontal tuft of narrow, pendant feathers, some of them from five to six inches long.

Some young birds of this species never uttered a sound of any kind during the whole time I had them alive in my garden—probably a week or more.

According to Captain Hutton, *Catarrhactes chrysocome* forms "rookeries" at Antipodes Island, higher up the hills than *C. sclateri;* but there are none on the Bounty Islands or on the Snares.

Writing to me of this bird, Mr. W. Smyth, who is a good observer, says: "When excited, it erects its crest all round like a rainbow, whereas *E. pachyrhynchus* erects its crest in rather a tufty or brush-like style."

* *Trans. N. Z. Inst.*, vol. xxiv., p. 73, and pl. xiv., fig. 2.

CATARRHACTES PACHYRHYNCHUS.

(VICTORIA PENGUIN.)

Eudyptes pachyrhynchus, Gray; **Buller, Birds of New Zealand, vol. ii., p. 287.**

The name of Rock-hopper, by which *Pygoscelis papua* is known, might also well be applied to this species. It moves along the ground with great celerity, and generally surmounts small bushes and other obstacles in its way by jumping clean over them. I have known one voluntarily enter a house and ascend the back staircase, right to the landing, hopping up step by step. It moves about through the scrub very deftly, picking its steps in a very cautious cat-like manner.

Unlike *Catarrhactes schlegeli*, this species is naturally wild in disposition and habitually silent. On turning out half a dozen of them in my garden, they all hurried rapidly away into the shrubbery, and when fairly out of sight one of them indulged in a vociferous chatter for some time, as if addressing his fellows and proposing some plan for their mutual safety. This reminded me of an amusing circumstance which the late Captain Fairchild had mentioned. His practice when he got a lot of live Penguins on board the 'Hinemoa,' as he often did, was to secure them in separate pens according to the species. He told me that on one occasion, in the pen occupied by the Victoria Penguins, one of the birds, on gaining a higher foothold than the rest, vociferated loudly, whilst the others kept quiet and appeared to listen. So, to accommodate the birds, he had what he termed a "little pulpit" erected in the midst of the pen. He says it was most ludicrous to see one of the Penguins, like a member of the French Senate, sedately mount this rostrum and address his fellows for several minutes at a time in the most energetic manner, the other Penguins keeping perfectly silent. Then an impatient auditor would waddle up alongside, turn the speaker out of the chair, mount into position, and have his say to the crowd, and so on, the audience being perfectly quiet and orderly.

This species bites fiercely, and I saw one fairly run after and attack the hands of a man who had been attempting to capture it.

One of the birds brought to me by Captain Fairchild from the Snares was saved when the others were converted into specimens. Originally very savage and pugnacious, this bird became quite tame and docile. He would follow the gardener about in the most persistent manner to be fed. After he had settled down to the new condition of things he took up his quarters in the kennel with a young Gordon-setter. During the heat of the day he would take refuge in the kennel, coming abroad in the cool of the evening and during the early morning. He lived on terms of perfect amity with the dog, for whom at times he testified his affection by gently pecking him all over the body with his bill, an attention which the sagacious animal seemed quite to appreciate.

At the end of February I saw a nestling of this species partly fledged. The down of the upper surface was sooty-black, with a brownish tinge; that of the under-parts white, excepting a band of the dark colour, which crossed the fore-neck under the chin.

The young of the first year presents only an indication of the yellow crests.

According to Mr. Bethune, who has visited the Islands for many successive years in the 'Hinemoa,' and collected birds there, this is the only species of Crested Penguin inhabiting the Snares.

Having met with some remarkable instances of melanism among specimens of *Catarrhactes schlegeli* and *Megadytes antipodum*, I discussed with Captain Hutton before I left New Zealand the probability of his Black Penguin (*Eudyptes atratus*) being an abnormal form of the common

Catarrhactes pachyrhynchus, and he quite agreed with me, although the so-called species had been discriminated and named by himself. I afterwards discovered that this view had been adopted by Mr. Grant in the Catalogue of the British Museum (vol. xxvi., p. 639).

Captain Hutton writes me that he thinks *Catarrhactes sclateri* is more common than *Catarrhactes pachyrhynchus* in New Zealand. My experience is to the contrary. All the specimens of the former in the British Museum are from the Auckland, Bounty, and Antipodes Islands, and all those of the latter from New Zealand. I have collected many specimens of *C. pachyrhynchus*, both North and South, but I have seldom seen an example of *C. sclateri*, except in collections from the islands.

The local distribution of the Penguins, like that of the Petrels, as determined by their breeding-grounds, is very curious. From my own observation, and from information received from Captain Hutton and the officers of the Government steamer, the following distribution of our Penguins on their respective breeding grounds may be taken as absolutely correct:—*Aptenodytes patagonica*, *Pygoscelis papua* and *Catarrhactes schlegeli*, on Macquarie Island; *Catarrhactes pachyrhynchus*, on the Snares; *C. sclateri*, on the Bounty Islands, Auckland Islands,* and Antipodes Island; *C. chrysocome*, on Antipodes Island, Campbell Island and Macquarie Island; *Megadytes antipodum*, on the Auckland Islands, Campbell Island and the extreme south of New Zealand.†

Mr. W. W. Smith records ('Ibis,' 1890, p. 463) the occurrence of a wanderer on the Kakanui river, in North Otago, six miles from the sea; and another on the Ashburton river, twelve miles from the sea.

COLONY OF CATARRHACTES PACHYRHYNCHUS ON THE SNARES.

* Captain Hutton says he did not find this species in the Auckland Islands; but my type came from that locality. Sir James Hector afterwards sent me an example, in spirit, also obtained there; and there are specimens in the British Museum so labelled.

† Hutton says also Stewart Island; but, although it is quite likely, I have never actually heard of a nesting place there. I have myself recorded one on the Otago Coast (*Trans. N. Z. Inst.*, vol. xxix., p. 203).

CATARRHACTES SCLATERI.

(SCLATER'S PENGUIN.)

Eudyptes sclateri, Buller, Birds of New Zealand, vol. ii., p. 289.

This Penguin is conspicuously larger than *C. pachyrhynchus*. The golden facial streak commences near the angle of the mouth, which is surrounded with a bare membrane as in *C. schlegeli*, although not to the same extent. The irides are reddish-brown, and the legs and feet flesh-white.

On the 25th of February the 'Hinemoa' brought me from Antipodes Island four living examples of this species and ten of *Catarrhactes chrysocome*. The examples of *Catarrhactes sclateri* interested me very much, because although young birds, they were somewhat advanced, and just undergoing the first seasonal moult—throwing off the adolescent plumage and assuming that of the adult state. The young of this species has the plumage of the upper parts much duller, being mixed with brown, and the throat, instead of being black, is greyish-white, darker in some specimens than in others. In one of the two which I secured the chin was white, and this portion of the plumage not having moulted off, the bird presented a singular appearance, the white chin being very conspicuous. In the young bird the superciliary streak, which is broad and well defined, is white, instead of being golden-yellow, as in the adult. This species is found both on Antipodes Island and on Campbell Island. It has never, I believe, been found on the Auckland Islands. The species inhabiting that group is *Megadytes antipodum*.

A bird undergoing the first moult (February) presents the following features: Yellow facial streak broad and distinct, in a line with the nostrils, but at present extending only one inch beyond the head; throat black, with well-defined lower margin, the old white plumage still adhering to the chin for the space of one inch from the angle of the crura of the lower mandible, and giving a very peculiar appearance to the head. The old dark plumage is still clinging to the forehead, and the feathers are peeling off the flippers; but all the body-plumage has been completely renewed.

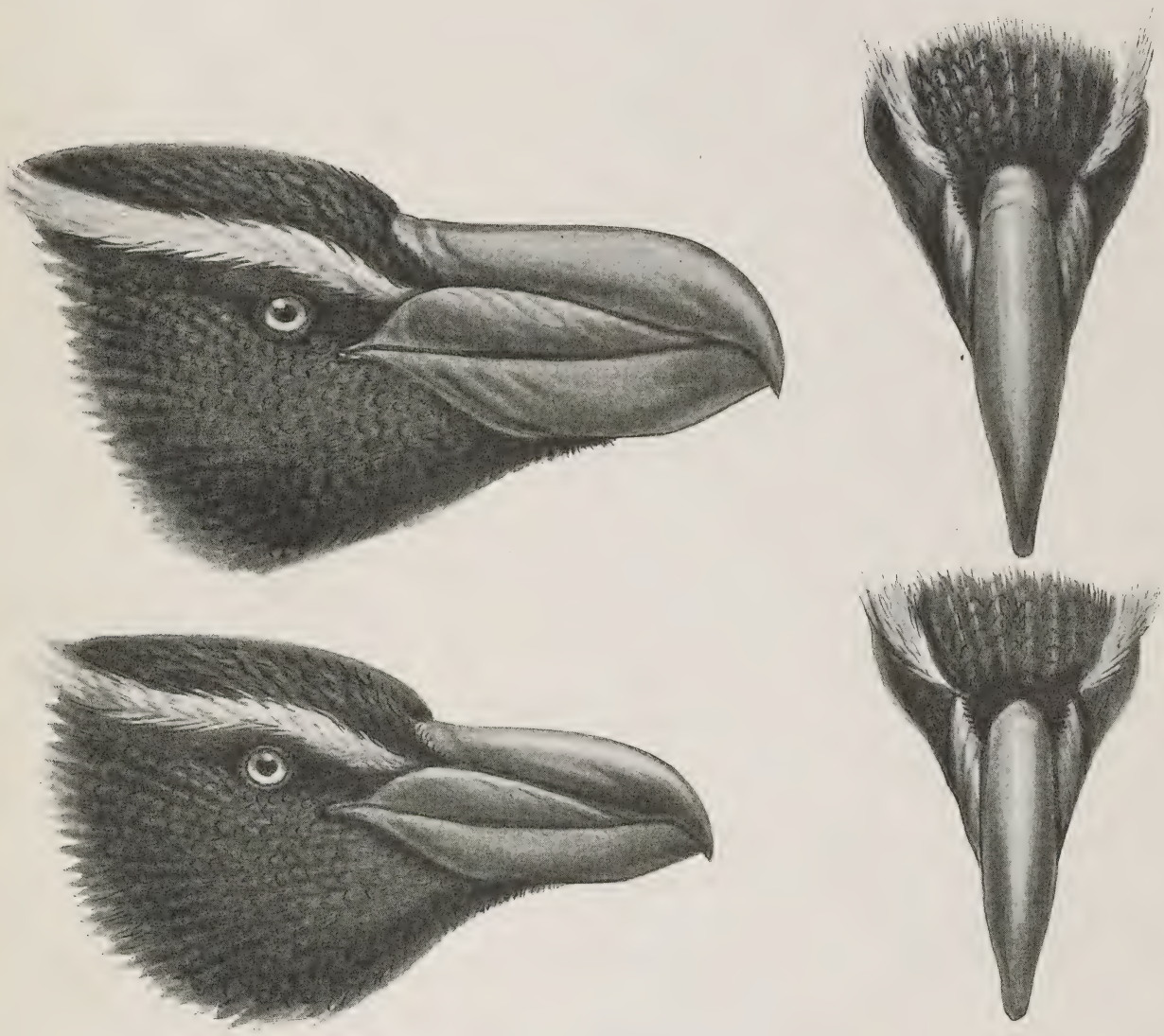
Young of first year.—Differs from the adult in having the plumage duller, and the throat dark grey, shading into the dark plumage on the sides of the head; a broad superciliary streak of white springing not far from the angles of the mouth. At the first moult the white streak is replaced by a golden crest, the feathers of which project beyond the head. Bill dark-brown, and less robust than in the adult.

Nestling.—Upper surface covered with dark sooty-brown down, short and thick in texture; under surface white. Bill black.

Of this species, hitherto only known as occurring on the Auckland Islands, I have obtained an adult pair killed on the Otago coast. This Penguin, when captured, utters a cry not unlike the scream of a brood-hen when taken off her nest.

Mr. Ogilvie Grant, in the 'Catalogue of Birds,' British Museum (vol. xxvi., p. 641), expresses surprise that I did not make more of the form of the bill when describing this species, and he

gives a woodcut representing the bills of this species and *C. pachyrhynchus* respectively.* When Mr. Grant becomes more familiar with Penguins, he will discover that the size and shape of the bill is a very unsafe criterion as a specific character. A glance at the subjoined figures, taken from two adult female specimens of *C. pachyrhynchus* in my collection, will sufficiently demonstrate this.



TWO HEADS OF CATARRHACTES PACHYRHYNCHUS.

As Captain Hutton has pointed out to me by letter, my picture of "Penguins at home" (vol. ii., p. 293) represents, in reality, a group of *Catarrhactes sclateri* on the Bounty Islands, and not *C. pachyrhynchus*. The Albatroses in the same illustration belong to Mr. Rothschild's new species, *Thalassigeron salvini*.

* What Mr. Ogilvie Grant says is: "Although Sir Walter Buller first distinguished this species, he appears to have overlooked the really important difference to be found in the shape of the bill and the wider white margin of the wings." He says also: "The pale golden eyebrow-stripe commences immediately above the gape, but in some specimens it is indistinctly continued towards the nasal opening, and is one of the least reliable characters." In this Mr. Grant is quite at fault. The difference in the yellow facial streak is the great distinguishing feature between the two species. So satisfied was Dr. Sclater that I was right in this respect that, without any reference to me, he gave coloured drawings of the heads of both species (P.Z.S., February, 1889), in illustration of my paper, in order to bring out this feature as distinctly as possible. Mr. Grant says further that I overlooked the broader white margin of the wing. He is at fault again; for I stated the converse in my original description: "the posterior edge of the flippers, in its middle portion, has a border of white nearly ·25 of an inch in width, running off on both sides to a point." It is unfortunate that the compiler of a portion of the British Museum 'Catalogue' did not think it necessary to be more accurate.

CATARRHACTES SCHLEGELI.

(SCHLEGEL'S PENGUIN.)

Eudyptes schlegeli, Finsch; **Buller, Birds of New Zealand, vol. ii., p. 298.**

In disposition and character this bird differs entirely from the Victoria Penguin (*C. pachyrhynchus*). It is naturally one of the tamest and boldest of birds. It was quite amusing to notice the behaviour of four living ones which I had turned loose in my garden. They always kept in close company and acted together, as it were, automatically. They sometimes walked up and down the garden paths in Indian-file, at other times they walked abreast, but always in unison. Where one went, the others would go; and, if interrupted, or crossed in their path, they would attack savagely with their powerful beaks, and endeavour to turn the flank of the intruders, instead of turning back. They were more noisy than the other species, especially at night and during the early morning, uttering at intervals a cry like that of the domestic Gander, and at other times a sound strangely like the bleating of a sheep—such as one hears at intervals from the pen at shearing-time. Their ordinary cry, frequently repeated, is not unlike the cawing of Rooks. They selected a favourite resting-ground, and, although they wandered freely over an acre of garden, they always came back to it. They seemed never tired of dipping in the water and preening their feathers. When brought to me, they were undergoing their annual moult, and presented a singular appearance, with the old plumage hanging about them and peeling off in strips. By the end of July they had completed their moult, and were in bright plumage, although their crests were only half developed, and their tail-feathers only just appearing. This species has a bare flesh-coloured membrane round the angles of the mouth, which imparts a very peculiar expression to the face, and admits of a wide expansion of the mandibles. It has bright red irides, and feet of a dull gamboge-yellow colour.

Observations on caged birds, or those kept in close captivity, are not perhaps of very much value from a scientific point of view; but, when (as in the present case) the birds had the freedom of a garden and shrubbery, with access to water, they could be studied with almost as much advantage as in their native habitat. Having several species of Penguin associated together in this way, I was much struck with the wide difference in their natural disposition and habits of life. Even individuals exhibited differences of character; but as between the species, these differences are very marked.

The ordinary attitude of Schlegel's Penguin is half upright, sometimes with both flippers extended, then one depressed, then both, just as if the bird was signalling to his fellows by semaphore.

I am able now to give the measurements of this species, taken from specimens in the flesh, from Macquarie Island.

Adult Male.—Length, 29 in.; extent, 23·5 in.; length of flipper, 9 in.; bill, along the ridge 3·25 in., along the edge of lower mandible 3·5 in.; tarsus, 1·5 in.; middle toe and claw, 3·7 in.

Adult Female.—Length, 26·5 in.; extent, 21 in.; length of flipper, 8 in.; bill, along the ridge 2·5 in., along the edge of lower mandible 2·8 in.

The birds having at that time just completed their seasonal moult, their tails had not grown, and therefore no measurements are given.

In both sexes the feet are of a delicate yellow colour. Irides bright chestnut-red; the eye flat, as in the other species, having the appearance of a button, the pupil being extremely small. At the angle of the mouth there is a fleshy membrane of a dull pink colour, forming, when the bill is closed, a conspicuous, slightly tumid, triangular patch. The sexes are alike, but the male has a more robust bill and a larger amount of golden-yellow in the vertex and crest.

Young.—Has the throat entirely grey; this diminishes in the second year's plumage, and appears to disappear altogether in the third year; but this is more conjectural on my part than certain. Some adult birds with rich golden or orange crests show vestiges of their adolescent grey plumage.

I have met with a remarkable case of melanism in this species, the skin having been received from Macquarie Island. The following is a detailed description:—

Upper surface slaty-black with a blue tinge, the margins of the feathers being of that colour; crown and nape darker, with brownish-black tips, much produced. Under surface uniform sooty or slaty-black, relieved by burnished greyish points on the fore-neck; flippers blue-black on both the upper and under surfaces, with a very narrow exterior edging of pale brown. There is hardly any appearance of crests, but beyond the eye, on each side, the feathers are somewhat lengthened and are tinged, more or less, with golden-yellow. There is a very slight tinge of the same colour discernible on disturbing the feathers of the vertex. There is (as well as I can make out in the dried specimen) the same fleshy membrane at the angles of the mouth. Three small white feathers which I plucked from the abdomen confirms the view of melanism.

The specimen under notice gave the following measurements:—Extreme length 2 ft. 8 in.; length of flipper 7·30 in.; tail 4 in.; bill, along the ridge 2·75 in., along the edge of lower mandible 3 in.; tarsus 1·25 in.; middle toe and claw 3·25 in.; hind toe and claw 0·62 in.; maximum depth of bill about 1 in.—the upper mandible with a deep groove in the line of the nostrils.

I have had an opportunity of examining four curious specimens of this bird from the Macquarie Islands. Three of them are partial albinoes. No. 1 has the entire surface of the flippers and the whole of the body below their insertion white, tinged with cream-colour on the upper parts. There is no distinct line of demarcation against the dark plumage above the wings, but each feather has a brown centre, and this increases in extent till the darker plumage is reached; above the tail there are also a few touches of brown; and the tail-feathers, which are white, have brown margins; rest of the plumage normal, the golden-yellow on the forehead being extensive and very vivid. Nos. 2 and 3 have less white on the upper surface, the plumage of the back being pale yellowish-brown. The fourth specimen has a strong tendency towards melanism. On the right-hand side of the body there are large irregular patches of slaty-black feathers, covering about one-third of its extent. There is also a cloudy patch on the throat.

In two other examples submitted to me there were scattered feathers of the same colour on the under-surface of the body.

In Mr. W. H. Bickerton's article, mentioned on page 79, a vivid picture is drawn of the multitudes of these birds on Macquarie Island. He says:—

When we reached the 'rookery' the Penguins were there in countless numbers; an immense flat, between one and two miles across, was crammed full of them. And then the row they made!—before arriving at the rookery the noise reminded us of sheep, but when we turned the corner and saw them ahead it was deafening, and we soon found ourselves of necessity shouting at the top of our voices. It took some little time for shouting to become natural, and often we would face each other and start talking with voices that were inaudible.

Royal Penguins commence coming to the Macquarie Islands in January to moult—their breeding season being from September to the beginning of December. Although we did not arrive until March, the birds had not all finished moulting then, but kept coming in from the sea until almost the end of the month.

When the Penguins first arrive, they are so fat that they can hardly walk, and are just able to waddle up to the rookeries. Owing to the birds arriving at different dates, the moulting lasts for three months, but the actual time a Penguin takes to moult is only three weeks. During the whole of this period the birds do not eat, but gradually absorb all their fat, to prevent themselves from starving. The circumference of a Penguin before moulting is about three times that of one which has moulted; so striking is this difference, that at first we were fully convinced that they were the old and young respectively.

Having got rid of his old coat, a Penguin looks very handsome in his new plumage—everything he has on seems to fit so well, and is of such an excellent cut. But he is so thin, that it seems as if his breast-bone must cut through the skin.

The cunning with which Penguins land amid the awful surf is wonderful. They face the wave just before it breaks, and dive underneath, coming up again behind, ready for the next one; by-and-by one comes which seems smaller to them than the previous ones, and then they roll themselves up into a ball, and are swept on to the shore with terrific force. The speed with which they are carried on does not matter in the least to them; and we see them being rolled over and over on the beach, until the wave begins to go back, when they uncurl, and waddle up to the dry shingle, shaking themselves to get the water off their feathers. Sometimes the back-wash is too strong for the birds, and they are carried again into the sea; however, the operation is repeated, until finally one sees them safe upon the beach, waiting for their mates to land, before starting off to the rookeries.

All the Penguins go about in pairs, and the in-coming birds form a long white line round the beach, marching two by two, until the creek leading to the rookeries is reached. Here, in spite of the millions of little feet which have passed along, the ground becomes too rough and narrow for double marching, and the birds separate; one going a little way ahead, stopping constantly and looking anxiously round to see if the other is following close enough. Wherever the path permits it, the pairs rejoin, and walk again side by side. The consideration shown by the mates to each other is a very pretty sight, and affords a lesson to poor suffering humanity; but it would hardly do to follow them in all things—as for instance the constant quarrelling with their neighbours: this weakness is developed to an alarming extent, and the noise of the fighting is dreadful.

In the rookery the birds stand upright with their mates, their white breasts often touching, thus helping each other to stand more comfortably. Day by day their feathers become more untidy, and the birds seem to grow bigger and bigger, until those who have moulted look like little children beside the others. Then gradually the feathers fall off, and the bird itself hastens matters with its beak. In the awkward places the mates help each other, and the confidence with which each bird turns to the other when it cannot help itself is very interesting.

If two Royal Penguins are separated, and carried a little way out of sight, they walk disconsolately about until they see each other again. As soon as they find their mates they rush together, and the intense joy expressed by every movement, as they are hurrying forward, is impossible to describe. There is a humming and flapping of wings as they meet, and a soft 'cawing' noise, until at last they sink upon one another's necks and talk love in their peculiar Penguin language. These birds seem to be an intensely loving race, although their emotions are somewhat narrow—never extending beyond the 'family circle.'

The rookeries are on the slopes of the hills, and the top Penguins have a very trying time after they have finished moulting: they have to pass right through the rookery to get to the sea, and every bird pecks at them as they pass. Their method of going through is to hold up their heads as high as they can, and make a dash for it, resting wherever there is room to stand out of reach of the unfriendly beaks of the other Penguins. Sometimes one of a pair arrives at the bottom first; but, instead of rushing off to the water (and they do love the sea), it waits patiently until its mate arrives also, then they waddle off together, both very weak from their long fast, but full of eagerness to get into the water. As they get down near the edge, their steps quicken, and they both run in, and stay swimming and diving out among the breakers for some little time. Then they come to land again, and prune their feathers with scrupulous care, shaking and stretching their wings, as if to test whether they are at all stiff, after their long rest.

This first swim is only a 'preliminary canter,' but now they are really off, and soon two little white dots appearing now and again on the tops of the far-off rollers are all that can be seen of this small couple, so lately nestling at one's feet.

The laying season of Royal Penguins begins in September. They have only one egg, and both male and female take turns in hatching and feeding the young one until it can go to sea and fish for itself; this happens when it is about three months old. In hatching, the egg is simply laid on the ground, the parents in turns lying forward upon it; it takes a month for the egg to break.

At first we felt quite diffident of trying to go through a rookery of Penguins, the birds not having a scrap of fear. They pecked violently at our moleskins and leggings whenever we approached them, but our guide did not mind, and plunged straight in, kicking the birds out of his way, and separating them as if he were going through a thick patch of tussocks. All the way through the birds objected in a deafening chorus, and this seems to be their favourite mode of expressing extreme disgust.

It is impossible to describe the numbers of these birds, but when I recall the face of a hill covered with Penguins, 'millions' sounds a weak mode of expression. 'Square miles' will perhaps be better.

Walking along one day at the bottom of one of these rookeries, with a breeze blowing down hill, I gradually became covered with small feathers, and on looking up I was astonished to find that they came from the birds moulting. With this wind blowing it looked as if snow were falling, the feathers in the air giving the peculiar yellow effect seen during snowstorms.

Captain Hutton writes ('Emu,' July, 1902, p. 2): "On the land Penguins are not so active as in the water, but it is a mistake to suppose that they are plantigrade, or, in other words, that they apply the lower surface of the metatarsus to the ground when walking or hopping. They walk or hop on their toes like other birds, and it is only when they are resting that they place the metatarsus on the ground, a habit which is by no means peculiar to Penguins. When on the snow or smooth ice they are said to lie down on their stomachs, and push themselves along with their wings so rapidly that a man running can hardly keep up with them. When on shore they sleep a good deal in the daytime, tucking their heads behind their small wings, while they make a hideous noise all night. So I fancy that day and night are much the same to them. They feed largely on cuttle-fish and crustacea, but no doubt they eat fish as well."

Mr. R. Carrick, a very observant man, who was sent down by the Colonial Government to examine and report generally on the groups of islands to the south of New Zealand, writes:

All these Penguins are migratory in their habits. They roost in the sub-Antarctic from about the end of November to the beginning of April. Where they go, and how they occupy themselves in the interim, is not known, beyond that they get into high southern latitudes—possibly Victoria Land, on the banks of the Great Ice Gulf. Ten, or maybe twelve, weeks hence, and these outlying island ranches will most likely be fully occupied—and busier scenes of bird-life could not be witnessed.

This home-coming to the sub-Antarctic is a most wonderful performance. Each clan, 'hapu,' or call it what you like, returns to its own particular quarters. It was the opinion of the late John Fairchild—and he was a close observer—that each individual bird occupied its original site or seat. They form a breast-line extending miles along the surface of the sea, and wherever one touches land the word is passed along, and the 'hapu' to which the land, in right of previous occupation belongs, files off. That is the story as I got it in demonstration of the wonderful sagacity shown in threading these trackless seas; and I am not going to scoff at it, simply because it does not happen to lie within the pale of human comprehension.

A word more regarding this home-coming. The Penguin leaves these shores poverty-stricken and emaciated, but returns again fat and plump—proving that in the purvey he is quite as apt as he is in the pilotage.

I agree with all that is said about bird-life as a most fascinating study, and one which the conservation of these islands will tend to promote.

CATARRHACTES CHRYSOLOPHUS.

(MACARONI PENGUIN.)

Eudyptes chrysolophus, Brandt; **Buller, Birds of New Zealand, vol. ii., p. 297.**

I have recorded (*op. cit.*) two examples obtained in New Zealand. I have now to add a third one, now in my collection, which came from Macquarie Island.

This species has a general resemblance to *C. schlegeli*, but its bill is considerably smaller, its crest of yellow feathers is less developed, and it is readily distinguishable from that species by its blue-black throat, this colour tapering to a point on the upper fore-neck.

Unlike the two New Zealand specimens mentioned above, the Macquarie-Island bird has a conspicuous spot of yellowish-white on the upper tail-coverts.

MEGADYPTES ANTIPODUM.

(YELLOW-CROWNED PENGUIN.)

Eudyptes antipodum, Hombr. & Jacq.; **Buller, Birds of New Zealand, vol. ii., p. 294.**

There is a distinct tendency in this species to melanism. I had an opportunity of examining the skins of eleven specimens that were taken together, in a sort of breeding colony, on the coast, near the Otago Heads. Several of them had jet-black feathers scattered among the pure-white plumage of the under-parts; and in one of them I counted as many as nine of these black feathers.

A correspondent, who had one of these Penguins alive for some time, sends me the following note: "When excited it has the habit of erecting all the feathers on the front of the head, and as far back as the yellow band. When thus seen the silky lustre and varying shades of bronze down the sides of the neck are very beautiful."

The officers of the 'Hinemoa' have told me that this is the most delicate of all the Penguins, seldom surviving confinement more than a day or two. They were unable to bring me any live ones, but they brought one for His Excellency the Governor, which I had an opportunity of examining. I observed that, in life, it has peculiar flat, button-like eyes.

Young.—In the bird of the first year the coronal band, so conspicuous in the adult, is entirely absent. In the full-plumaged bird the white of the under-parts is continued right up to the crura of the lower jaw, the darker colouring of the sides of the neck fading imperceptibly into it. In the young bird the throat is pale grey.

According to Mr. Grant, in the British Museum 'Catalogue,' the young bird differs from the adult in having the yellow band confined to the sides of the head and not encircling the crown; whilst in still younger examples in the Tring Museum the yellow band is entirely wanting.

CATARRHACTES VITTATUS.

(THICK-BILLED PENGUIN.)

Eudyptes vittatus, Finsch; **Buller, Birds of New Zealand, vol. ii., p. 299.**

I OBTAINED a specimen of this very rare Penguin at Stewart Island at the end of February. The bird landed of its own accord in the little bay in which we were temporarily residing, and came hopping up the steep garden-path to the very door of the house, as if anxious to make the acquaintance of a practical ornithologist. It passed bravely through a group of tourists who were standing about, and snapped savagely at those who attempted to arrest its progress. I saw at a glance that it was not one of the common species, and, receiving my visitor with every expression of delight, speedily annexed him. Curiously enough, he allowed me to stroke his head without resistance and, later on, submitted to be killed with the philosophy of a Penguin.

I have since received a fine adult pair from the Southland coast.

Dr. Sharpe has omitted this species in his 'Handlist of Birds'; and Mr. Oglivie Grant, in the 'Catalogue of Birds,' British Museum (xxvi., p. 638), writes: "There can scarcely be any doubt that the species is founded on a worn and faded example of *C. pachyrhynchus*." He bases this belief on a photograph of the bird sent to him by Captain Hutton. But I have seen the type specimen, and I think Dr. Finsch is right in discriminating it as a distinct species.

Captain Hutton, in his interesting article on 'Penguins,' published in *The Emu* (vol. ii., part 1, July, 1902), says:

> That the Penguins are descended from flying birds is proved by the structure of the wing. Not only are the bones on the same pattern as that found in other birds, but several of the muscles of flying birds are represented in the Penguins by non-contractile tendinous bands, which are functionally useless, but which have not yet altogether disappeared. It is certain that they are not closely related to the Auks of the northern hemisphere—which are somewhat like Penguins in appearance—but that they come nearest to the Petrels, or Tubinares, although the two groups are so different in form. This makes it difficult to guess what the ancestors of the Penguins were like.
>
> The oldest Penguin known is *Palæeudyptes antarcticus*,* from the eocene or oligocene rocks of New Zealand. But it is a true Penguin, and, except that the wing is proportionally rather longer than in living Penguins, it shows no other intermediary character. The only other known fossil Penguins are four species of *Paleospheniscus* and one of *Paraptenodytes* from the miocene of Patagonia.
>
> It is worthy of notice that the remains of *Palæeudyptes* are found in the Oamaru freestone, which is the remains of an old coral reef, and that in the miocene period also the sea, both in New Zealand and in Patagonia, appears to have been warmer than it is now.
>
> *Palæeudyptes* is represented by the humerus, coracoid, femur, and metatarsus. The skull, unfortunately, has not yet been found. It was larger than any living Penguin, probably from 5 to 6 feet high, and was thought by Professor Huxley, who described it, to be more nearly related to the genus *Eudyptes* (= *Catarrhactes* + *Megadyptes*) than to any other.

Captain Mair, writing to me of the small Blue Penguin, says: "In December, 1894, I met some boys who had found a Penguin and young in an old shaft at the foot of the hill behind the Thames township, at the head of May Creek, so that to reach its nest and carry food to its young the bird must have travelled up the street every time, and run considerable risks from dogs, &c. Penguins are very rarely seen so far up the Gulf."

* Huxley, Quart. Jour. Geol. Soc., xv., p. 672 (1859); and Hector, *Trans. N. Z. Inst.*, iv., p. 341 (1872).

EUDYPTULA MINOR.

(BLUE PENGUIN.)

Eudyptula minor, Gmelin; **Buller, Birds of New Zealand, vol. ii., p. 30.**

Captain Hutton expresses an opinion that Eudyptula albosignata (meaning this form) "appears to be restricted to Banks' peninsula"; but during a period of some years I have obtained numerous specimens, from time to time, in the Hauraki Gulf and in Cook's Strait.

Australian naturalists record that undoubted examples of this species have been taken near the South Solitaries Islands, off the New South Wales coast.

EUDYPTULA UNDINA.

(LITTLE BLUE PENGUIN.)

Eudyptula undina, Gould; **Buller, Birds of New Zealand, vol. ii., p. 320.**

In his 'Catalogue of Penguins' in the British Museum, Mr. Ogilvie Grant drops *Eudyptula undina*, and recognises only *E. minor* and *E. albosignata*; in point of fact, he substitutes Dr. Finsch's *Eudyptula albosignata* for *E. minor* and *Eudyptula minor* for *E. undina*. This might be a more convenient nomenclature, but I cannot follow him, because it does violence to the long-established rule as to priority of names.

Eudyptula undina was described by Mr. Gould as far back as 1844 ('Proc. Zool. Soc.' of that year, p. 57), being founded on specimens obtained at Circular Head, Tasmania. It is a smaller bird than the then well-known *E. minor*, described by Gmelin in 1788, and owing to the brighter colouration a skin could be picked out of a hundred specimens of the other without any difficulty. If Finsch's name of *albosignata* is intended to apply to one of these two species—as it certainly is—then it will not stand, and becomes a mere synonym. The question remains as to which of them should the name go? Evidently to *E. minor*, because of the larger size. The only distinguishing features given by Mr. Ogilvie Grant are: "upper parts of a much lighter greyish-blue, both the outer and inner margins of the flippers widely bordered with white [these are the distinguishing characters of *E. minor* as compared with *E. undina*] and, in addition, a more or less distinct white patch towards the middle of the inner margin." As pointed out long ago by myself ('Trans. N.Z. Inst.,' vol. vii., p. 210),* this is a very variable character. It may have been absent, or it may have been overlooked, in the original type of *E. minor*, but this is not sufficient to justify a change of name. The diagnosis continues: "upper tail-coverts, as well as the tail feathers generally white." Mr. Ogilvie Grant's punctuation does not show whether he means "tail feathers generally, white" or that these parts are "generally white." As a matter of fact they seldom are so—only, indeed, in individual cases. Out of the four British Museum examples, two have the tail and its coverts, white; in the others the colour of these parts is blue.

Some ornithologists are for uniting this species with *Eudyptula minor;* but, as will be seen on comparing specimens, they are readily distinguishable from each other. There is a manifest difference in the size of the bill, and *E. undina* is further separable by having the entire under-surface of the flippers white.

I have had an opportunity of examining a pure albino of this species, obtained by Mr. Black at Mercury Bay. The entire plumage was snow-white, with a silky gloss on the under-parts.

* See also *Trans. N.Z. Inst.*, vol. viii., p. 198.

Procellariidae

OCEANITES OCEANICUS.

(WILSON'S STORM-PETREL.)

Oceanites oceanicus (Kuhl), **Buller, Birds of New Zealand, vol. ii., p. 250.**

Referring to the specimens obtained by Dr. Kidder's expedition on Kerguelen Island, Dr. Elliott Coues remarks: "I have looked at a great many 'Wilson's Petrels' from various parts of the world, without having been able to see any differences between them. In any event, the bird here presented is the original *oceanica* of Banks, Kuhl, &c.; it is the other one, *wilsoni*, Bp., 1824, which is to be cut away from this one, if any division is attempted. Bonaparte has the thing hind part before in his 'Conspectus.'" Of the habits of this species on shore the following interesting particulars are given: "These birds are crepuscular near the shore, like *Garrodia nereis*, and much more common near our station after their first appearance on the 8th December. I had previously seen them at sea east of the Cape of Good Hope; and on the 14th December I saw them clearly out by day, feeding on the oily matters floating away from the carcass of a sea-elephant. They frequent rocky parts of the hill-sides, and flit about very like swallows in pursuit of insects. There seemed to be no flying insects on the island, however, other than very minute gnats. The two specimens preserved were shot on the evening of the 29th December, among the rocks near the top of the hill on which we were encamped. I never succeeded in finding the eggs, but learn from the Rev. Mr. Eaton, who found one on Thumb Mountain, some fifteen miles from our station, that it is single and white, and that the nest was made under a large rock not far from the beach. He found the egg on the 8th December. I have no doubt, from what I have observed of its habits, that it nests among and under rocks habitually, and usually at a considerable elevation above the sea."

Relating to this species, I find the following entry in my diary for 1894:—

4th February (about 60 miles off Cape Verd).—A beautiful cool day, with just sufficient breeze to fan the air. About 11 o'clock at night a Storm Petrel (*Oceanites oceanicus*), attracted by the glare of the electric light, dashed itself on board, and was captured by one of the passengers. It proved on dissection to be a ♀, and the stomach contained pasty organic matter of a greyish-brown colour. Length, 8·5 in.; extent of wings, 17·5 in. . . .

8th February.—No birds; but about noon I observed two large porpoises in the distance, moving very languidly, as if it was too much exertion even for them to plunge about in this tropical heat. To-day is beautifully fine, but there is no animated object to break the monotony of this great wilderness of waters. Since seeing the large Petrel on the 3rd instant we have traversed over two thousand miles of ocean without seeing so much as the wing of a bird, with the exception of the Storm Petrel that came on board on the 4th, and the little visitant from the shore on the preceding Sunday. In this respect this is a veritable Dead Sea: so different, indeed, from the great southern ocean, with its plenitude of bird-life at all seasons of the year! We look for a change in this respect now that we have crossed the Equator.

The attention of collectors should be directed to these smaller Petrels. The seas surrounding New Zealand and extending to Australia form, so to speak, a great nursery for this family, of which no less than forty-five species, belonging to fifteen genera, are already on our list; and, as comparatively trivial characters often distinguish them, it is not unreasonable to look for the discovery of new species from time to time.

GARRODIA NEREIS.

(GREY-BACKED STORM-PETREL.)

Garrodia nereis (Gould), **Buller, Birds of New Zealand, vol. ii., p. 247.**

The late Captain Fairchild brought me a specimen from Cape Farewell Lighthouse, where it had killed itself by striking against the lantern at night.

Mr. Henry Travers brought specimens of this Storm-Petrel (adult and young) from the Chatham Islands. The nestling is covered with sooty-grey down on the upper parts, and the young bird assumes the colour of the adult at the first feathering.

Mr. Townson's collection contains an adult which was caught at a bushman's camp, some miles inland of Westpost, where it was flitting around the wood-fire at night.

In the male the dark plumage extends well down on the breast and under the bend of the wing, the line across being well marked. In the female it extends even further down, but it is mixed with greyish-white, especially on the throat; under surface of wings white, changing black towards the outer edge; middle part of wings and upper tail-coverts grey. The sexes are exactly of the same size—wing from flexure 5·5 in.; tarsus 1·3 in. The tibia is bare for half an inch.

Captain Hutton found this small Petrel breeding on the Auckland Islands.

PELAGODROMA MARINA.

(WHITE-FACED STORM-PETREL.)

Pelagodroma marina (Latham), **Buller, Birds of New Zealand, vol. ii., p. 248.**

I am indebted to Mr. C. H. Robson for a note stating that he had obtained an egg of this species, and that, instead of being all white, the larger end is sprinkled with reddish-brown spots. He is possibly mistaken in the bird, for I have obtained a number of specimens from Otago, together with the skins of the birds, taken from the burrows, and in all cases the shell is entirely white. The egg of *Garrodia nereis* (the Grey-backed Storm-Petrel) is, however, marked in the manner described. He may therefore have confounded the two species.

Mr. Macpherson records a specimen obtained on the north-west coast of England. ('Ibis,' 1891, p. 602.)

The nestling of this species is covered with thick sooty-grey down, paler on the under parts. The black tips of the primaries are the first to appear; then the plumage of the crown, shoulders, and sides of the body. A partially fledged specimen in my collection (from the Chatham Islands) has the primaries very narrowly edged with white, the secondaries more so, and their coverts with a broad terminal wash of greyish-white; bill and legs black, the inter-digital webs of the latter flesh-coloured.

Dr. Forbes, who collected the eggs of this Storm Petrel in the Chatham Islands, thus describes them:—

> Elliptical in shape. Dimensions—1·4 in. by 1·0 in. Ground colour, white at one end, covered with fine dots of heliotrope-purple and lavender-grey, with a few of seal-brown interspersed, and at the other end sparsely with vinaceous-buff. In some specimens the end is thickly dusted over with the finest vinaceous-rufous dots, while on the rest of the egg they are scarcely recognisable.

I have in my possession a newly-hatched nestling, looking like a ball of slaty-grey down, with a greyish-black bill protruding. A more advanced nestling has the bill and legs black, with dark quills just sprouting from the wings.

FREGETTA MELANOGASTER.

(BLACK-BELLIED STORM-PETREL.)

Fregetta melanogaster (Gould), **Buller, Birds of New Zealand, vol. ii., p. 249.**

No further specimens have been, to my knowledge, recorded in New Zealand.

The following is from an entry in my diary for 1894 :—

21st February.—Lat. 43° 20′ S., long. 41° 14′ E. Several *Diomedea exulans*, and one *Diomedea regia*—distinguishable at almost any distance by its perfectly white head and neck and the large amount of white on the wings—were in attendance to-day. There were also some Dove Petrels (*Prion desolatus*), and fully a dozen Black-bellied Storm-Petrels (*Fregetta melanogaster*). The last-named species is very active on the wing, flies high and in wide circles, a manner of flight very different from that of the other species of Storm-Petrel already noticed. It seems to be decidedly gregarious in its habits, whereas *Oceanites oceanicus* is a solitary species, being generally seen singly or in pairs. During the day, several of the Sooty Albatros (*Phœbetria fuliginosa*) followed us, and I noticed that this species sometimes sails in couples, which *D. exulans* never does, nor indeed, so far as I am aware, any other species of Albatros.

PUFFINUS GAVIA.

(FORSTER'S SHEARWATER.)

Puffinus gavia, Forster; **Buller, Birds of New Zealand, vol. ii., p. 236.**

I OBTAINED a specimen of this apparently rare Petrel (an adult male) from Circle Hill, about twelve miles from Milton, in the provincial district of Otago, in the month of July; then an adult female from Cape Farewell; and, later on, half-a-dozen more from the Nelson district, shortly before leaving New Zealand. Although at certain seasons of the year very numerous off our coasts, extremely few specimens are to be met with in our local museums and other collections. The single example which I took to England with me, in 1886, was quite unique, as no specimen of this bird then existed in Mr. Salvin's splendid collection of Petrels, or even in the British Museum.

I received several fresh specimens from Mokohinu Island. Bill blackish-brown, changing to grey on lower mandible; legs and feet yellow, changing to blackish-brown on outer side of tarsus and along the edge of outer toe; claws and interdigital webs black.

We have at length discovered the breeding-place of this species. I find that these birds resort in large numbers to Stephen's Island, in Cook Strait, for the purpose of reproduction; and, through the kind offices of Mr. Lyall, the lighthouse-keeper there, I obtained six eggs. They are of a rather narrow ovoido-conical shape, perfectly white, and differing appreciably in size, the largest of the series measuring 2·45 in. in length by 1·45 in. in breadth, and the smallest measuring 2·20 in. by 1·45 in. A nestling, obtained in the Hauraki Gulf on the 8th November, was covered with very long and thick down of extremely soft texture, and dark slate-grey, on the upper parts; down thick and close, and of a paler grey, on the under parts, fading to whitish on the crop and fore-neck. Black feathers just beginning to appear on the wings.

There are two examples of this bird in the Canterbury Museum; but, so far as I am aware, the species is not represented in any other local collection.

PUFFINUS ASSIMILIS.

(ALLIED SHEARWATER.)

Puffinus assimilis, Gould; **Buller, Birds of New Zealand, vol. ii., p. 239.**

A fledgling which I have received from Sunday Island (one of the Kermadecs) is a very pretty object. The plumage is as in the adult, except that the longer wing-coverts and inner secondaries are minutely tipped with white; but the long, fluffy, dark-grey down still adheres to the sides of the body, and as the bird squats it looks as if reposing in a luxurious nest of down, which projects an inch or more from the body, and has a charming effect.

A specimen of the adult in the flesh, received from the Hauraki Gulf, has greenish-grey feet, with yellow inter-digital webs, marked with black on the outer edge; bill bluish-black.

From Cuvier Island, Mr. David Lyall wrote to me: "I am sending you a little box containing a Petrel found on this island, which I have not been able to identify. [This proved to be *Puffinus assimilis*.] This island is not so good for birds as Stephen's Island, where I was stationed before, for the ground is very hard and dry, so that there are few places where the birds can burrow. Cats are here and all the land-birds have disappeared."

Of this species Captain Hutton writes:—

It seems that the Kermadec-Island birds are smaller than those from New Zealand, for Sir W. Buller remarks, that the bird in the British Museum, obtained by Mr. John Macgillivray on Raoul Island (= Sunday Island) is somewhat smaller than the New Zealand birds, thus agreeing with the present specimen. In New Zealand this species is common in the Hauraki Gulf, but I have not seen it south of Auckland. In the south it is replaced by the larger species *P. gavia* (Forst.), which is most abundant about Cook's Strait and diminishes in number both to the north and to the south. Sir W. Buller, in his 'Birds of New Zealand,' 2nd edition, vol. ii., p. 236, considers the bird from the Great Barrier Island which I called *P. assimilis* ('Trans. N.Z. Inst.,' vol. i., p. 161) to be *P. gavia*, but this is not correct. The mistake, however, is my fault, for when in my 'Catalogue of the Birds of New Zealand' (Wellington, 1872, p. 79), I showed that *P. gavia* of Forster—which had up till then been thought to be an *Œstrelata*—was a species of *Puffinus*, I confused it with *P. assimilis*, although this species appears to be distinct. Of this species Mr. Cheeseman says that great numbers were breeding on Meyer Island in August, 1887. They dig out burrows for their nests, often of considerable length.

PUFFINUS OBSCURUS.

(DUSKY SHEARWATER.)

Puffinus obscurus, Bonap.; **Buller, Birds of New Zealand, vol. ii., p. 238.**

No further specimen has been recorded. The only claim, therefore, of this species to be regarded as a New Zealand bird rests on the single skin in Messrs. Salvin and Godman's collection "said to have come from New Zealand" (*op. cit.*, p. 238).

A male specimen was picked up dead by a gamekeeper on the Earsham estate (near Bungay) in Norfolk, about the 10th or 12th April, 1858. (See *Zoologist* for that year, p. 6,096.)

PUFFINUS BULLERI.

(BULLER'S SHEARWATER.)

Puffinus bulleri, Salvin; **Buller, Birds of New Zealand, vol. ii., p. 240.**

The Petrel described by Mr. Sandager under the name of *Puffinus zealandicus* ('Transactions of the New Zealand Institute,' vol. xxii., p. 291) was, until lately, deposited in the Otago Museum. It is undoubtedly the same species as that described by Mr. Salvin under the above name. It would seem to be a somewhat rare form in New Zealand seas, for, up to the present time, only four examples are known, one of which is in the cabinet collection in the British Museum. Of the other three, one is in the Tring Museum, another in the Colonial Museum at Wellington, and the third, being the example described by Mr. Sandager, is in the author's collection. In the 'Birds of New Zealand' (2nd ed.) this Petrel and *Œstrelata gularis* are figured together on the same plate, and, with the rock background, they form a very effective picture. My original specimen was a storm-tossed one on the Waikanae beach, in October, 1884: Mr. Sandager's bird flew against the lantern of a lighthouse; and the British Museum specimen was purchased by Mr. Salvin from a dealer who said it had been obtained on the New Zealand coast.

A specimen brought from the Mokohinu Islands by Captain Fairchild in September, and presented by him (in spirits) to the Colonial Museum, has enabled me to describe the soft parts: sides of the bill greenish, the ridge and hook brownish-black; feet yellow, the outer side of the tarsi and outer toes, and a line along the base of the middle toe on its outer side, blackish-brown. The bird proved to be a male, and the greenish colour of the bill is probably a sexual character, because there was no such appearance with my specimen (a female), although it was picked up fresh on the Waikanae sands. Mr. Sandager, in his description of *Puffinus zealandicus*, which I have identified with this species, says that "the lower part of both mandibles is bluish, remainder black."

I may here correct a common error among local ornithologists—that of confounding *Puffinus* with Puffin, the two birds having no relation whatever to each other. The principal offender in this respect is Mr. Reischek, who has contributed some interesting notes on the various species of *Puffinus* to the pages of our 'Transactions,' and persistently calls them "Puffins." Professor Newton, in his admirable 'Dictionary of Birds'—a book which should be on every ornithologist's shelves—gives the following explanation of this popular mistake: "The name 'Puffin' has been given in books to one of the Shearwaters, and its latinised form *Puffinus* is still used in that sense in scientific nomenclature. This fact seems to have arisen from a mistake of Ray's, who, seeing in Tradescant's Museum and that of the Royal Society some young Shearwaters from the Isle of Man, prepared in like manner to young Puffins, thought they were the birds mentioned by Gesner ('Hist. Avium'), as the remarks inserted in Wlloughby's 'Ornithologia' (p. 251) prove; for the specimens described by Ray were as clearly Shearwaters as Gesner's were Puffins."

In January, 1896, off Cape Kidnappers, about 10 o'clock in the morning, I saw a Petrel hovering quickly over the surface of the water, which, as well as I could make out, was *Puffinus bulleri*. The dark mark on the wings was conspicuous, the colours were those of that species, and the bird's elongated form seemed to make the identification complete. It kept near the water till it was out of sight.

PUFFINUS GRISEUS.

(MUTTON-BIRD.)

Puffinus griseus (Gmelin), **Buller, Birds of New Zealand, vol. ii., p. 232.**

A NESTLING obtained from one of the islands in the Hauraki Gulf, on the 18th of November, was covered with thick down, long, extremely fine, and dark slate-grey in colour on the upper parts; shorter and thicker on the under parts; paler grey on the sides of the body; white on the fore-neck, crop, and down the centre of the abdomen, in a broad band, to the vent.

Of this species there is a partial albino (received from the Snares) in the Auckland Museum. The back is almost entirely white, and the grey plumage of the under-surface is largely mixed with white.

The late Dr. Shortland, nearly fifty years ago, published a graphic account of the "Mutton-birding" operations of the Maoris in the South Island. These operations have been continued annually ever since, and it is a perfect marvel that the species continues to exist, in undiminished numbers, notwithstanding this wholesale slaughter. The last information I have on the subject is contained in the following newspaper paragraph: "The *Western Star* reports the arrival of a craft from the Mutton-bird Islands with the Riverton and Colac Bay contingent, which comprised seventeen families, numbering fifty individuals. The natives report that the birds were exceedingly numerous this season, and in splendid condition. The catch of each individual, young and old, may be taken at the fair average of fifteen hundred birds, or a total of seventy-five thousand for the whole of the families. The average price is about 3d. a bird, so that the season's operations, when the birds are all sold, represent a total of £937 10s. Two Riverton girls are said to have made a record catch, taking four thousand two hundred birds between them."

After leaving the Bluff for Stewart's Island in the steam tug (on February 19th), I saw in Foveaux Strait about a hundred Petrels, apparently of this species. They flew in company, streaming out from the shore and making for the open strait. This was in broad daylight. This Petrel has an even, rapid, and somewhat dove-like flight.

At Timaru, on April 5th, 1899, I witnessed a most interesting sight. We were passing through by the express train southward, and at about 3 p.m., in the soft sunshine, just after we had passed the township, we saw resting on the sea hundreds of thousands of Mutton-birds, and hundreds of thousands more on the wing travelling southward. For the space of fully half an hour, going at express-speed, we saw a steady stream of these birds as far out to sea as the eye could reach: there were probably a million or more, and they were apparently heading their way for Foveaux Strait, which seems to be the metropolis of this species in New Zealand.

Mr. Robson wrote to me, in December, from the Moeraki Lighthouse: "We have a great many Mutton-birds about here at this season. I have been quite surprised to find them addicted to robbing. They go into the bush at night and rob the nests of small birds, taking either eggs or young; and they will also attack meat if hung out of doors."

Off the coast of Tasmania, in March, 1894, I saw a flock of Mutton-birds (*Puffinus griseus*) numbering many hundreds, and packed so closely together on the water that they looked like a sand-bank or reef till the approach of the steamer made them take wing.

Mr. Alan Jackson, writing from Naseby on the 19th May, 1899, says of this species: "I found one of these birds in a gully being worried by a hawk (*Circus gouldi*). The hawk was prancing round and driving in at it every now and then, for all the world like a fighting cock in full play; the Petrel was on guard all the time, but was undoubtedly getting the worst of it, the hawk being taller and more upright. I drove off the hawk and secured the poor victim, which seemed perished with cold, there being about six inches of snow on the ground. I was astonished at finding such a bird so far inland."

At Stewart Island Mrs. Hensen gave me an egg avowedly of this Petrel. It measures 2·37 inches by 1·87; narrowly ovoido-elliptical in shape; originally white, it had become soiled by contact with the bird's feet.

PUFFINUS CARNEIPES.

(FLESH-FOOTED SHEARWATER.)

Puffinus carneipes (Gould), **Buller, Birds of New Zealand, vol. ii., p. 234.**

By the kindness of Mr. Reeves, the lighthouse-keeper on Mokohinu Island (in the Hauraki Gulf), I have obtained a pair of these birds in spirit. The species appears to have a strictly northern range, for I have never heard of a specimen further south than the Bay of Plenty, where there is a breeding colony of them, although in a very inaccessible place, on the Island of Karewa.

Dr. Ramsay writes ('Proc. Lin. Soc., N.S.W.', vol. iii., p. 406) :—

This species of *Puffinus* represents on the N.S.W. coast the *Nectris brevicaudus*, of South Australia, and is as numerous in certain places as that species is there.

Among other places they frequent the Solitary Islands in great numbers during the breeding season, which lasts from September to December. Through the kindness of James Barnett, Esq., the Colonial Architect, I have received from Messrs. MacLeod, Jennings, and Murray, a fine series of these birds and their eggs.

The birds arrived early in September, and at once betook themselves to excavating their nesting-holes, which are short burrows in the ground, about six inches in diameter and twelve to twenty inches in length. In no instance was more than one egg obtained in a burrow. The males and females assist each other in incubation; out of five specimens of birds taken from the burrows, four proved to be females. There is no difference in the plumage of the sexes. The eggs are apparently laid at night; the birds arrive in countless numbers in the evening, and most of them, the males probably, or those not engaged in hatching, return to the sea at daylight in the morning. As many as twenty dozen eggs have been taken on a single morning, the workmen at the lighthouse finding them a very delicious article of food. Their average weight is 2 oz.; the lightest and smallest sent me weighed 1·5 oz. They are usually of an oval form, 2·4 in. in length by 1·6 in. in breadth, of a pure white colour and of a smooth fine grain.* One specimen sent to me by Mr. MacLeod is more pointed at the thin end, and had very light brown irregular blotches on the thicker end. The shell is slightly different in texture and may belong to a species of Tern; nevertheless, it was obtained in one of the Shearwaters' burrows.

* The eggs of *Puffinus chlororhynchus*, Lesson, were erroneously described as those of *P. carneipes*, from the Seal Rocks, off the New South Wales coast, near Port Stephens. ('P.L.S., N.S.W.', vol. iii., p. 204.)

PUFFINUS TENUIROSTRIS.

(BONAPARTE'S SHEARWATER.)

Puffinus tenuirostris (Temm.), **Buller, Birds of New Zealand, vol. ii., p. 230.**

Mr. David Lyall, writing to me from Stephen's Island, in September, says: "There is one Petrel here that I cannot find anything about in your 'Manual.' It is not so large as the Mutton-bird, and lays a pure-white egg, of the size of a common fowl's. The colour of the bird is deep-black, and white on the under-side. It has a call almost the same as that of the Laughing Jackass, of Australia. I will send you a pair of them." He kindly did so, and it proved to be the above species. A specimen in the Canterbury Museum gives the length of wing from flexure as 10·75 in., exactly the same as in my type-specimen (vol. ii., p. 230.)

Young.—Uniform slaty-black, darker on the upper surface, and inclining to grey on the throat.

There is a locally killed specimen of this Petrel in Mr. Townson's collection at Westpost. It is an adult bird, in black and white plumage.

Captain Hutton writes, on a specimen from the Kermadec Islands:—

Length 15 inches, wing 10·75, tail 4·25, bill 1·2, tarsus 1·9, mid-toe 2·1. In addition to the slender bill and short tail this species can be readily distinguished by the under wing-coverts, which are greyish-brown, and considerably lighter than the upper wing-coverts; while in *P. chlororhynchus* the upper and lower wing-coverts are of the same tint, and in *P. griseus* the under wing-coverts are rather paler grey. In *P. tenuirostris* the lower mandible is said to be paler in colour than the upper, but this does not show in the dried skin. This species is not uncommon in the North Island of New Zealand, but I have never seen a specimen from the South Island. *P. griseus*, on the contrary, is extremely abundant at Stewart Island, Foveaux Strait, and gets rare further north.

The following is from 'The Story of the Bell Family, or Twelve Years on the Kermadec Islands':—

The Petrels—there are nine kinds, and we have names of our own for them—the Black Burrower, the Mutton-bird, the White Burrower, the Short-billed Titi, the Long-billed Titi, the Little Storm-Petrel, and three others that we had no names for—abound on the island. The Mutton-birds and Burrowers come to the island in millions in the breeding season, and the nesting place of the Burrowers is very like a rabbit warren; while the Mutton-bird is content with a few twigs to do duty for a nest. The other birds peculiar to the island are the Tropic-bird, a beautiful salmon-pink in colour, the Terns, of which there are several kinds, and the Tui and the Kingfisher from New Zealand.

Mr. Elsdon Best writes, in his 'Sketches from Tuhoeland':—

The Titi, or Mutton-bird, was formerly taken in numbers at Lake Waikaremoana, though now never seen in this locality. These birds were caught as they flew against an extended net, a fire being kindled in order to attract the birds. A net some 30 feet in length was set up on the edge of a cliff, the net being supported and stretched by means of poles or stakes stuck into the ground. A fire was kindled before the net, and on the extreme edge of the cliff. Between the fire and the net the fowlers seated themselves, each armed with a stick. Attracted by the fire, the birds flew against the nets, when they were struck down with the sticks. A foggy night was usually selected for this important function. In striking the birds, the fowlers were careful not to draw blood from the same. Should they do so, it was a 'puhore,' or token of bad luck—and few birds would be taken; they would cease to come to that fire. Also, should the first bird taken chance to fly against the 'tama-tane' (upper rope of net), or the 'mata-tauira' (the X of poles, where lashed together), that was a 'puhore.' But should that first bird strike the 'tama-wahine' (lower rope of net) or near it, that was a 'marie,' or sign of good luck—many birds would be taken. The nets were made of dressed flax. The old people generally employed themselves in making such nets, as well as snares and many other articles necessary to the old-time Maori. Mutton-birds were cooked at the 'ahi matiti'—of which more anon—the bones taken out, after which they were packed in calabashes by the inland tribes, and in 'poha' (vessels formed of a kind of seaweed) by the coast people. The fat collected from them was then poured over them and the vessels closed up.

PUFFINUS CHLORORHYNCHUS.

(WEDGE-TAILED SHEARWATER.)

Puffinus chlororhynchus, Lesson; **Buller, Birds of New Zealand, vol. ii., p. 235.**

This Petrel is called on Sunday Island the Black Burrower, on account of its uniform dark colour and habit of breeding in under-ground burrows.

I think I ought to put on record the following letter, received some time ago from Mr. W. M. Crowfoot, of Beccles, Suffolk:—"My friend Mr. Dalgleish, of Edinburgh, draws my attention to the fact that, in the last edition of your most valuable book on the birds of New Zealand, in the article on *Puffinus griseus*, you state that my remarks on *Puffinus sphenurus* in Norfolk Island probably refer to *Puffinus griseus*. I think this is a mistake, as a skin of the Norfolk Island species (which I at first thought was *P. griseus*) was sent to me by my correspondent, Mr. Metcalfe, and I forwarded it to Mr. O. Salvin for his inspection. He returned it to me as *Puffinus sphenurus* of Gould. I have since received the eggs of *Puffinus griseus* from New Zealand, and find that they are much larger than those of *P. sphenurus*, and of a different colour. My specimens of the egg of *P. griseus* measure 3 in. by 2 in., and $3\frac{1}{8}$ in. by 2 in. respectively, and are of a yellowish-white colour, whereas the eggs of *P. sphenurus* measure $2\frac{3}{4}$ in. by $1\frac{3}{4}$ in., and $2\frac{1}{2}$ in. by $1\frac{7}{8}$ in. respectively, and are of a pure-white colour, just like those of *Puffinus anglorum* and *P. kuhli*."

Captain Hutton writes:—

There are five specimens in the collection [from the Kermadec Islands], all of which are larger than those from any other locality which I can find recorded, as the folowing measurements will show. Length, 18·5 inches; wing, 12·75; tail, 6·5; bill, 1·65; tarsus, 1·9; mid toe, 2·2. Called the 'Black Burrower' by the settlers.

It arrives in the month of October in each year, often in very large numbers. It digs out burrows, often several feet in length, on the edges of the cliffs, or on the margins of inland terraces (*Cheeseman*).

Of this species Mr. North writes:—

During the months of November and December this bird was found breeding on Lord Howe Island in great numbers, and like most of the *Procellariidæ*, they dig a long tunnel or burrow in the sand or the soft earth; many of these burrows are several feet in length, and a single egg is deposited at the extremity, which, when fresh, is snow-white, but soon becomes stained and soiled. There is great variation in the shape and size, true ovals, lengthened and swollen ovals predominating, some terminating abruptly at one end, others being sharply pointed.

Length (*a*) 2·35 inches by 1·67 inch; (*b*) 2·45 inches by 1·6 inch; (*c*) 2·45 inches by 1·68 inch; (*d*) 2·57 inches by 1·64 inch.

Captain Hutton, in writing of *Puffinus chlororhynchus*, gives the following as a synonym:—"*P. carneipes*, Cheeseman (*fide* Buller), 'Trans. N. Z. Inst., vol. xxiii.,' p. 226, not of Gould."* But this is obviously a mistake; for I never saw Mr. Cheeseman's specimen and was never consulted about it. On turning to Mr. Cheeseman's paper, cited above, I find that he says: "I am not quite certain whether this species is correctly identified, all my specimens being fledglings that have not yet lost their down." Where Mr. Cheeseman sought my assistance in the identification of species he has mentioned the fact in his paper.

From the Kermadecs I received two examples of *Puffinus chlororhynchus*, just as I was starting for England, in 1892. I brought them with me, and, on submitiing them to Mr. Salvin, he confirmed my identification.

* *Proc. Z. S.*, 1893, p. 749.

PRIOFINUS CINEREUS.

(GREY PETREL.)

Adamastor cinereus (Gmel.), **Buller, Birds of New Zealand, vol. ii., p. 241.**

The late Captain Fairchild brought me a pair of this comparatively rare species of Petrel, shot by him, a few days before, halfway between Wellington and the Chatham Islands. One of them being in the flesh, I am able to supply the actual measurements, hitherto known only from the skin.

Female.—Extreme length, 22in.; extent of wings, 51in.; wing from flexure, 15in.; tail, 5in.; bill, along the ridge 2·2in., along the edge of lower mandible 2·3in.; tarsus, 2in.; middle toe and claw, 3·25in. The bill is perfectly black on the ridge, but changes to horn-colour on the hook; the sides of both mandibles are bluish-grey, but a black line extends down the middle of the lower mandible and widens out on meeting the unguis, which is dull horn-colour. The irides are very dark brown, almost black. The legs and feet are greyish flesh-colour, shaded with slaty grey on the heel and on the outer side of tarsus and toe; interdigital webs yellowish with grey edges.

This was the first time Captain Fairchild had obtained specimens of this Petrel during the many years he had navigated the Government steamer. He came upon them in calm weather; stopped the engines, lowered a boat and secured two birds out of a large flock. It cannot, therefore, be very plentiful. But it appears to enjoy a wide oceanic range, for I have in my collection an example taken at sea not far from the Cape of Good Hope.

The following passages (most of them relating to this species) are from my diary for 1893, recording my observations during an ocean voyage:—

7th March.—We had a very tempestuous night, and this morning not a single Albatros was to be seen. But we were now followed by a flock of about forty large Grey Petrels (*Priofinus cinereus*). The flight of this bird is very light and buoyant, with scarcely any movement of the wings, the back being slightly arched, the head drawn in close to the body, and the tail partially spread. The motion is very graceful and, as the birds unceasingly cross and recross each other's course in ever-varying circles, they furnish the listless passenger on deck with very pleasant diversion. It would seem that different areas or tracts of the ocean's surface are inhabited by distinct species of Petrel, their presence or absence being doubtless regulated by the abundance or otherwise of their special food-supply; and also that this species of Petrel, like many others, hunts in communities. For, as we proceeded on our course, there were fresh recruits, till, at the close of the day, we had fully a hundred of these aerial followers close in our wake. On garbage being thrown overboard they would quickly congregate and settle down upon the waters to dispute over its possession, manifesting their eagerness by a twittering or squeaking cry. About noon (lat. 51° 54′ S., long. 150° 34′ W.) a single Albatros appeared among these Petrels, and later on another, and then a third. A large Black Petrel, with a white bill (apparently *Majaqueus parkinsoni*) joined the company for a short time, its dark plumage making it a conspicuous object among the lighter-coloured birds.

11th March.—Calm weather, with intense cold and no birds. A solitary Grey Petrel passed and repassed astern of us several times, and then made off across the waste of waters, leaving us to pursue our course easterly, without a sign of animation around or above us. Towards evening a Giant Petrel (*Ossifraga gigantea*), the first we have seen, made a long sweep ahead of us, flying low, and keeping at a distance from the ship. This species is common enough in higher latitudes.

12th March.—No appearance to-day of the Grey Petrel, although the weather seemed favourable enough.

3th March.—Grey Petrel again numerous; also *Diomedea culminata*, the young birds (with dark-coloured head and neck) predominating, and an occasional *Diomedea exulans*.

14th March.—At noon on this day we had got as far south as lat. 56° 52′ without, however, having seen any icebergs. The Grey Petrel (*Priofinus cinereus*) is, I should say, far and away the commonest species of bird in these seas. It is evident that the same flock does not keep in constant attendance like the Albatros, because I have noticed that, whereas one day the birds are shy and keep well astern of the ship, the next day they will fly over and around her after-part with every appearance of confidence. We have not, so far, seen any *Diomedea melanophrys*, a form very common in the South Pacific, but inhabiting a somewhat lower latitude. There is said to be a large breeding-place of this species on some outlying rocks near the Chatham Islands, which are visited periodically by the Maoris for the sake of the young birds.

15th March.—To-day was the last of the appearance of *Priofinus cinereus*, which followed us, but in diminished numbers, till nightfall, when we were in lat. 56° 52′ S., long. 82° 10′ W. It is clearly a strictly oceanic species, for we are still 150 miles from land. According to my observations on this voyage, the meridian of 152° represents the limit of its range to the westward; and it is significant that during the whole of my experience in New Zealand I have never known of its occurrence more than once in our adjacent seas.

17th and 18th March.—As we passed up into the waters of the South Atlantic, the weather being thick, bird-life for a time disappeared; but on nearing the Falkland Islands a Black Shag, after hovering round us on wearied wing for half an hour, took refuge on the ship.

19th March.—Dense fog in the morning, and no birds. It cleared off in the afternoon, and after passing the Falklands I saw a small Grey-and-White Petrel in the distance, and a solitary *Ossifraga gigantea*.

20th March.—Wet and foggy in the forenoon; not a wing to be seen. At noon we were in lat. 47° 30′ S. and in long. 53° 41′ W. I saw an Albatros in the distance (apparently *D. melanophrys*), a pair of Black-and-White Petrels of large size; also a flock of what appeared to be *Prion desolatus*, or an allied species; and at intervals, scattered flocks of *Oceanites oceanicus*, their white rump showing very conspicuously as they skimmed the surface of the water in their erratic flight.

21st March.—A flock of Storm-Petrels, and a few other birds too remote from the ship for identification, completed the day's list.

22nd and 23rd March.—One is much impressed by the general absence of bird-life in the South Atlantic. The waters are intensely blue to-day, with a light breeze blowing, causing crested wavelets as far as the eye can reach, but there is no sign of anything except a solitary Storm-Petrel now and then, or a pair of some larger species. Captain Kempson, who has made this journey by steamer two-and-twenty times, informs me that, as a rule, no Albatroses are to be seen after passing the Falkland Islands, but that in the winter months, and especially in August, he has known them to follow the ship some hundreds of miles further north. In the Indian Ocean, on the other hand, he has met with Albatroses two days north of the Cape of Good Hope, or quite near to the equator.

28th March to 1st April.—During the last five days, although the light south-east trades were blowing, and the tropics comparatively cool, there was not a bird to be seen. Twice only I saw in the distance a small flock of Petrels flying low. The only sign of animation was furnished by the shoals of tiny flying-fish, quitting for a moment their natural element, and performing a direct, rapid flight, as if endeavouring to elude the pursuit of some enemy under the surface.

2nd to 4th April.—Gentle north-east trades blowing. No birds seen when we were crossing the Line, except an occasional Storm-Petrel performing its erratic flight over the surface of the water after the manner of a bat hawking for flies.

In my diary for 1894, recording my observations on the return voyage, there are further references to this species:—

24th February.—The swell has subsided, and the wind is sufficiently favourable to enable us to have all our sails set. But there is a slight mist on the ocean, and not a bird of any kind to be seen. If the sea-birds are guided to the ship by their vision, the explanation is sufficiently obvious. A haze over the ocean renders the ship invisible at a little distance, although there may be, to all appearance, as seen from the deck, a clear space around it. The birds follow the ship on the same principle that Terns and Seagulls follow the plough on a newly-turned field. As the latter glean the grubs and worms, these feed on the small marine animals that are brought to the surface by the disturbance of the water in the ship's course, as well as on the garbage thrown overboard from time to time. We are now about 250 miles from Kerguelen's Land. In the afternoon the mist lifted, and we were at once visited by a few Albatroses and Storm-Petrels and by about half a dozen of the Grey Petrel (*Priofinus cinereus*), whose customary range we appear now to have reached.

1st March.—Same birds as yesterday. The steamer having stopped for twenty minutes, I observed that in calm water *Priofinus cinereus* dived for its food, first settling down on the surface, and then diving for a moment quite out of sight. About 11 p.m. the *Aurora australis* was again announced [see page 148], and the passengers left their cabins and crowded on deck to observe this strange phenomenon. It was certainly very magnificent. At first a luminous arch, with a broken or irregular outline, and resting as it were on a bank of cloud, appeared in the western sky, covering an extent of fully 50°. From this arch rays or flashes of white light ascended fitfully to the heavens; these long beams of light, shooting upwards almost to the zenith, travelled slowly along the arch, always moving from east to west; whilst every now and then a luminous expansion, like the tail of a giant comet, appeared in the sky for a few seconds, and quickly faded away. Then the arch widened, and presented a more regular circumference. This was succeeded by a pale rainbow-like effect of blending red and purple colours immediately above it, with coruscations of pure white light, forming a shifting halo, and for a few seconds only, a less perfect and fainter bow below the arch. This grand effect lasted only a brief time, and with its disappearance the arch itself melted out of sight. At this conjuncture the moon, which had hitherto been obscured, made her appearance through a rift in the clouds, and, although in her fourth quarter, shone forth with unusual brilliance. At the same moment a shimmering beam of light appeared below the shining crescent, and continued to lengthen itself out till it seemed to touch the horizon, when it gradually melted away; but the whole of the western sky was still illumined with flashes of pale light and luminous clouds, which quivered and pulsated as if produced (as no doubt they were) by electricity, and then insensibly passed away, the whole phenomenon from first to last occupying barely thirty minutes.

4th March.—Besides *Œ. neglecta*, there were a few of *Priofinus cinereus* to-day, but this was its last appearance.

THALASSŒCA ANTARCTICA.

(ANTARCTIC PETREL.)

Thalassœca antarctica (Gmelin), **Buller, Birds of New Zealand, vol. ii., p. 229.**

This Antarctic form has been added to the list by Sir James Hector on the authority of a specimen (now in the Colonial Museum) shot on the high seas between New Zealand and Tasmania. It was no doubt a straggler from a much lower latitude.

The 'Challenger' Expedition reported it "very numerous about the ships when south of 60° S. lat., and near the Antarctic ice; often seen sitting on the icebergs."

I find the following entry in my diary for 1894:—

2nd March.—At 5 p.m. the rare *Thalassœca antarctica* paid us a visit and made three circuits at a moderate distance from the ship. It is a beautiful object on the wing, and has a very graceful flight. Lat. 48° 35′ S., long. 111° 26′ E.

PRIOCELLA GLACIALOIDES.

(SILVERY-GREY PETREL.)

Thalassœca glacialoides (Smith), **Buller, Birds of New Zealand, vol. ii., p. 228.**

Mr. F. Sandager writes to me of this rare species (under date of 1st October): "To-day, as I was going along the beach at Moeraki, a species of *Procellaria* came in. By means of your 'Manual' I had no difficulty in identifying it as *P. glacialoides*."

Before leaving the Colony I obtained a fine pair of this rare Petrel—one bird coming from Nelson and the other from Otago.

MAJAQUEUS PARKINSONI.

(BLACK PETREL.)

Majaqueus parkinsoni, Gray; **Buller, Birds of New Zealand, vol. ii., p. 242.**

Mr. J. Brough, of Nelson, in sending me a skin of this Petrel, furnishes the following notes: "This bird was killed in February on a dividing range between the head of the Heaphy and the Big River. It was found in a hole at the roots of a huge rata, in the midst of dense forest. I am quite satisfied that this bird is the 'Night Demon' of our diggers. I had a live one some time ago from Collingwood, and I kept it for three months; so I had every opportunity of observing its habits. It was strictly nocturnal, and would never feed by day. On windy nights the bird would become very excited, and then it would give vent to the hysterical laugh or scream from which it takes its name of 'Night Demon.'"

A specimen in the flesh (adult female) sent to me from Manawatu measured 18 in. in length, and 47·25 in. in extent of wings. It is often met with at the diggers' camps far inland, in the Westland district, being attracted by the fire at night. A Petrel called Taiko by the Maoris—found in burrows far inland, Bay of Islands—is supposed to be this species.

Dr. Ramsay states that this Petrel breeds on Lord Howe Island and on the adjacent rocks. But this statement must be taken with reservation, because he treats *M. parkinsoni* and *M. æquinoctialis* as synonymous terms!

On the 29th April, 1878, at a meeting of the Royal Society of New South Wales, Mr. Masters exhibited a specimen, shot near Sydney Heads, and remarked that it was the first recorded instance of this Petrel visiting the Australian coast.

MAJAQUEUS ÆQUINOCTIALIS.

(STINK-POT PETREL.)

Majaqueus æquinoctialis (Linn.), **Buller, Trans. N. Z. Inst., vol. xxvii., p. 122.**

I have obtained several specimens of this fine Petrel (adult and young) from the Auckland Islands. The peculiar odour, which is characteristic of all Petrels in life and never entirely quits the dried skin, is very pronounced in this species, and quite justifies the name by which whalers and sailors distinguish it, namely the 'Stink-pot.'

Dr. Kidder, in the paper already referred to, gives some interesting particulars respecting it in Kerguelen Island. He says:—

> A single specimen was dug up by the dog on October 12th, from a very deep burrow under a clump of *Azorella*, but none others were seen until November 15th, when they suddenly appeared in considerable numbers. On December 16th, I dug up specimens with eggs, and frequently thereafter. They nest in very

deep burrows, with almost always a little pool of water at their entrance, and keep up an incessant squealing while the dog is digging for them, very like the sound of the water-whistle toys, or ' whistling coffee-pots,' sold on the street-corners. The note is, in other words, very shrill, and constantly trilling. They fight the dog more bravely than any other Petrels, generally coming out of the burrow hanging to his ear, and keeping him off very successfully on the open ground. The name ' Stinker ' is fully warranted by the rank odour emitted by the bird, and is given on the authority of the whalers on the schooner ' Emma Jane.' Captain Fuller, however, of the schooner ' Roswell King,' a very careful observer, tells me that the Stinker is a much larger bird, and that it nests on the ridges of the high hills, not in burrows, and very late in the season. If so, I have never seen it. The egg is single and white. One of the first birds dug up by the dogs after our arrival, on September 15th, was a large Petrel, covered everywhere by long, grey, hairy down, and found quite near the station. They were found often afterward, and were much hunted by the dogs as food. From their squealing when captured, the structure of their bills, the depth of the burrows in which they were found, the black plumage of those subsequently taken, and their offensive odour, I supposed them to be the young of *Majaqueus*, but was assured by the whalers that they were ' Mutton-birds,' and of quite a different species. A curious circumstance with regard to them is the fact that I never succeeded in getting any positive clue to the old birds to which they belonged. At different times I set snares in front of the burrows, and sprinkled light dry earth within their entrance, but never captured any birds ; nor did I find any tracks upon the earth. It certainly seemed as if the old birds had finally abandoned them. It must be remembered, also, that one of these young birds was found as early as September 15th, and that I found *Majaqueus* with eggs on December 16th. The Mutton-birds had certainly not begun to fly before December. Two specimens captured on November 10th had the body still partially covered with down. The egg is single, regularly ovoid, and white, without shell-markings of any kind. It is generally, however, much soiled by secretions from the oviduct and dirt from the burrows. The shell is thin, homogeneous, and compact in structure, very smooth to the touch, but under the lens is seen to be marked by small pits and shallow linear depressions. The largest obtained measures 3·26 in. by 2·17 in.

Mr. Moseley found this Petrel breeding on Kerguelen's Land. It makes a hole much larger than that of the Mutton-bird, and nearly always with its mouth opening on a small pool of water, or on very damp ground. The hole is generally two yards or more in length, and the birds often have their holes in close company. When dug out from its nest and handled the bird utters a peculiar prolonged and high-pitched cry ; and it is also noisy on entering the hole and finding its mate there.

Captain Hutton, in describing a fine male specimen presented to the Canterbury Museum by Mr. Bethune, of the colonial steamer ' Hinemoa,' states that the bill, when fresh, had the sides of the upper mandible and the tubes blue, the culmen and unguis black, and the lower edge of the lower mandible flesh-colour. According to Mr. Bethune's account, the nests of this species on the Auckland Islands are in holes, made in the side of a slope, these holes being hollowed out into a circular chamber at the end. In this chamber the nest is raised several inches from the bottom, leaving a circular ditch round it. As with many others of the Petrel family, only a single egg is laid, and Mr. Bethune found the old birds sitting on fresh-laid eggs in December, while in the following May young birds were fully fledged, although still in their nests.

Mr. Salvin writes (' Cat. Birds, Brit. Mus.', xxv., p. 396) : " The amount of white on the chin varies very much in different individuals. Some have an irregular white stripe running from near the base of the mandible under the eye almost to the nape, and a transverse band across the forehead in front of the eye. Upon such specimens Gould founded his *M. conspicillatus*, a form recognised by Dr. Coues as distinct, but apparently connected with the typical form by every degree of variation."

ŒSTRELATA GOULDI.

(GREY-FACED PETREL.)

Majaqueus gouldi (Hutton), **Buller** [in error], **Birds of New Zealand, vol. ii., p. 145.**

Œstrelata gouldi,* Hutton, Trans. N. Z. Institute, vol. ii., p. 79 (1879).

This Petrel has the underneath part of the plumage white; that is to say, the basal part of the feathers on all parts of the body.

Nestling.—Covered with thick close down of a uniform blackish-brown colour.

Dr. Sharpe has dropped this species in his 'Handlist of Birds,' but I feel perfectly sure that it deserves recognition.

ŒSTRELATA LESSONI.

(WHITE-HEADED PETREL.)

Œstrelata lessoni, Garnot; **Buller, Birds of New Zealand, vol. ii., p. 219.**

Of this rare species—several examples of which, from the Auckland Islands, are in my collection—Dr. Kidder obtained only one specimen on Kerguelen Island. On December 29th it was brought home alive by one of the men, having been dug out of a very deep burrow by the dog, at a considerable distance inland, and well up among the hills. He describes the tarsus and foot as flesh-pink, black along upper surface of digits and on the web near the claw, and the irides as very dark-brown. He states that he saw them following the ship on the 18th January, about seven hundred miles north of Kerguelen, but unfortunately gives us no further particulars.

Captain Hutton found this species breeding on Antipodes Island.

Mr. Moseley, in describing this Petrel at Kerguelen's Land, says that for breeding purposes it makes a much larger hole than the *Prion*, as much as six inches in diameter and long in proportion. The curious feature is that at the end there is a round chamber with a slight elevation in the centre, where the nest is placed, being somewhat raised, with a deeper passage all round. He observed this mode of construction in both the nests he explored. The old birds were very savage when pulled out, emitting a shrill cry and biting fiercely.

Mr. R. Hall describes ('Ibis,' 1900, pp. 23-24) the nesting of this Petrel on Kerguelen Island. The sexes alternately take part in the incubation in the day-time. The burrows are in dry ground, and therefore the nests do not require to be raised, the egg being placed on a few gathered soft fibres and feathers at the end of the tunnel. The average size is 2·85 inches by 2 in. Mr. Hall took eggs containing well-developed embryos at the end of January.

* Mr. Salvin ('Cat. Birds,' B. M., xxv., p. 399) refers this bird to *Œ. macroptera*, Smith; but I am quite satisfied that it is a distinct species. Dr. Finsch says ('Trans. N. Z. Inst.,' vol. vii., p. 233): "I got the type specimen from the Auckland Museum for comparison, and am quite sure as to its specific distinctness."

ŒSTRELATA INCERTA.
(DOUBTFUL PETREL.)

Œstrelata incerta (Schlegel), **Buller, Birds of New Zealand, vol. ii., p. 220.**

The "Doubtful Petrel," having been finally accepted by Mr. Salvin, may now be regarded as a valid species. But, apart from this fact, I fear I have nothing to add to its history, no further New Zealand specimens having come to my knowledge.

ŒSTRELATA MOLLIS.
(SOFT-PLUMAGED PETREL.)

Œstrelata mollis, Gould; **Buller, Birds of New Zealand, vol. ii., p. 222.**

Of this species Mr. Cheeseman showed me at the Auckland Museum an interesting series of skins from Sunday Island (Kermadec group). Two of them had the plumage entirely dark, showing that this species, like many other sea-birds, exhibits a peculiar phase of dimorphism. This is a subject about which we at present know very little, and it would be interesting to ascertain whether the dark character of plumage becomes hereditary under favourable conditions—that is to say, when dark birds pair together—or whether in such cases there is a latent tendency to revert to the normal colouring. It would be instructive also to note the character of the offspring when birds of the two phases mate together, as is often the case.

In the Museum series there are two albinoes, both handsome birds, but one having the plumage of a purer white than the other.

Mr. Cheeseman kindly presented me with a specimen obtained by him on Sunday Island during a semi-official visit in August, 1887. It was known to the settlers there as the "Mutton-bird," and Mr. Cheeseman treated it as an undetermined species of *Majaqueus*. I have another example in my collection, from Otago; and if, as I believe, my birds are male and female, the sexes present no difference in plumage.

This species was originally described by Mr. Gould in the 'Annals and Magazine of Natural History' (vol. xiii., p. 363); and in his account of it in 'The Birds of Australia' he records a very remarkable circumstance. "It is a species," he says, "that will ever live in my memory, from its being the first large Petrel I saw after crossing the Line, and from a somewhat curious incident that then occurred. The weather being too boisterous to admit of a boat being lowered, I endeavoured to capture the bird with a hook and line; and, the ordinary sea-hooks being too large for the purpose, I was in the act of selecting one from my stock of salmon-flies, when a sudden gust of wind blew my hooks, and a piece of parchment 10 in. long by 6 in. wide, between which they were placed, overboard into the sea, and I was obliged to give up the attempt for that day. On the next I succeeded in capturing the bird with a hook I still had left, and the reader may judge of my surprise when, on opening the stomach, I there found the piece of parchment, softened by the action of the salt water and the animal juices to which it had been subjected, but so completely uninjured that it was dried and again restored to its original use when a further supply of flies could be procured."

Count Salvadori (' Ibis,' 1900, vol. vi., p. 302) says :—

This species is confined to the southern seas, especially the Southern Atlantic and Southern Indian Oceans, between the 20th and the 50th parallels ; the most western point where it has been found being Nightingale Island, near Tristan d'Acunha. In the Indian Ocean it probably lives round Kerguelen Island ; by Gould it is mentioned from the seas off the eastern end of St. Paul and Amsterdam Islands ; in the British Museum there is one specimen from North-west Australia and others (doubtfully) from South Australia. Prof. Giglioli, during the voyage of the 'Magenta,' met with this species between latitudes 42° 47′ and 40° 42′ S. and longitudes 3° 26′ and 53° 20′ E., and again in the South Australian seas from lat. 37° 22′ S., long. 112° 5′ E., nearly to the entrance of Port Phillip.

The presence of *Œ. mollis* in the seas north of New Zealand is open to doubt, and I should say that the specimens from New Caledonia—where, according to Layard, *Œ. mollis* breeds on Mount Mon—also require comparison.

But as the Novara Expedition (according to Dr. Finsch) collected specimens in lat. 35° S., long. 175° 5′ E., this species is entitled to a place in the New Zealand list.

ŒSTRELATA NIGRIPENNIS.

(ROTHSCHILD'S PETREL.)

Œstrelata nigripennis, Rothschild, Ibis, vol. v., 1893, p. 573.

A NEW species discovered by Mr. Salvin in the beautiful collection of Petrels at Tring, and named as above by Mr. Walter Rothschild, comes from the Kermadec Islands. He writes : "This species belongs to the *Œ. cooki* (Gray) section of the genus *Œstrelata*, of which *Œ. defilippiana* is also a member. It differs from all its congeners in having a short, stout, wide bill, and in the almost total absence of white on the inner webs of the outer primary beneath ; the under wing-coverts, with the exception of a rather wide margin, being white, as well as the axillary feathers."

Professor Hutton was mistaken in the following reference to me in a communication to the Zoological Society (' Proc. Zool. Soc., 1893,' p. 750), of which he kindly sent me a copy : " *Œstrelata nigripennis*, Rothschild (1893)=*Œ. cooki*, Cheeseman (*fide* Buller), ' Transactions of the New Zealand Institute,' vol. xxiii., p. 224 ; not of Gray." I am not aware that I ever saw Mr. Cheeseman's specimen ; and there is certainly no warrant for such a statement in that gentleman's paper (*op. cit.*) on the Kermadec Petrels.

Of this form of Petrel Captain Hutton writes :—

I have to thank Mr. Salvin for this determination. Five specimens, all alike, from Kermadec and Curtis Islands. Length 12 inches, wing 9·1, tail 4·5, bill 0·9, tarsus 1·1, mid toe 1·2.

In New Zealand this species has been confounded with *Œ. cooki*, from which it differs much in the stoutness of the bill and in the colours of the feet, as well as in the plumage. From *Œ. leucoptera* it differs in being lighter in colour and in the outer tail-feathers, having the inner web white at the base and speckled with grey at the tip.

The species is not uncommon during the summer months, arriving about the beginning of November and leaving again at the end of April. It breeds on Meyer Island, and, more sparingly, on Sunday Island, generally in company with *P. assimilis*. According to Mr. Cheeseman, it constructs a burrow sometimes over a yard in length, depositing a single pure white egg at the extremity.

ŒSTRELATA CERVICALIS.

(SUNDAY-ISLAND PETREL.)

Œstrelata cervicalis, Salvin, Ibis, 1891, p. 192.

Shortly before my visit to Europe in 1891 the late Captain Fairchild kindly presented me with a beautiful Petrel from Sunday Island, in both adult and young states. The bird appeared to me to be an entirely new species, but, as I was coming home, I decided to delay my publication of it till I could compare my specimens with the types in the British Museum. But I was too late, for, in the meantime, a Captain Carpenter had sent a skin to the Museum, and Mr. Salvin had named it as above.* It had fallen into good hands; and my only regret in the matter was that I had wished to connect Captain Fairchild's name with this fine species.

This Petrel, in life, is perhaps the loveliest of the whole group. So far as is at present known, its breeding resort is confined to a single island—one of the Kermadecs—where of late it has become, unfortunately, appreciably scarce. In the case of sea-birds, however, there is always the hope that there is some other undiscovered nursery where the species will be perpetuated.

Large numbers of these birds have been killed for the sake of their soft plumage, which finds a ready market; but, so far, it has been found impossible to take out entirely the peculiar Petrel-odour inherent to them.

Captain Hutton thus describes the young of this species:—

Nestling.—The down still on the back of the head, back, flanks, and crissum. The colours of the plumage resemble those of the adult, but are lighter. The feathers of the back are more broadly margined with light grey, as also are those of the uropygium. The upper wing-coverts, both greater and median, are margined with grey, and the feathers of the wings and tail are lighter than in the adult. On the other hand, the yellow of the feet and tarsi is much darker.

Mr. Cheeseman, who had not then been able to identify the species, writes of this Petrel in his paper, quoted on page 31, that it arrives in the Kermadec Islands about the end of September and remains till the end of June, being one of the last Petrels to leave. Its breeding place is usually near the mountain-top in some dark gully filled with palms and tree-ferns, and generally its burrow is made at the roots of the latter. It is solitary in its habits, and two of the nests are seldom found in the same locality. It is a nocturnal bird, and rarely leaves its burrow during the day. An egg sent to the Auckland Museum by Mr. Day measures 2·5 inches in length by 1·9, and is of the purest white.

The coloured drawing by Mr. Keulemans (Plate III.) gives a very true representation of this bird. Shortly before leaving the Colony, I had an opportunity of acquiring a good series collected by the Bell family, and this enabled me to present specimens to the Colonial Museum, to the Cambridge University Museum, to the Zoological Museum of Berlin, and to other public institutions.

* Mr. Salvin thus distinguishes the species in the 'Cat. Birds Brit. Mus.' (xxv., p. 411): "Similar to *Œ. externa* (from Masafuera Island), but much darker on the upper surface, the feathers of the back hardly showing grey edges; the under wing-coverts are less white, those of the edges of the wing being mingled black and white; the primaries have less white at the base of the inner web, the white portions being almost covered by the longest white coverts."

SUNDAY-ISLAND PETREL.

ŒSTRELATA CERVICALIS.

(ONE-HALF NATURAL SIZE.)

ŒSTRELATA NEGLECTA.

(SCHLEGEL'S PETREL.)

Œstrelata neglecta (Schlegel), **Buller, Birds of New Zealand, ii., p. 224.**

Under the name of *Œstrelata leucophrys*, Captain Hutton described, in the 'Proceedings of the Zoological Society' (1893, p. 749), a Petrel which he had received from the Kermadec Islands, his paper being illustrated by a beautiful figure of the bird from the pencil of Mr. Keulemans. I had, however, previously brought to England a good series of specimens from the same locality which I submitted to Mr. Salvin, who unhesitatingly referred them to the highly variable *Œstrelata neglecta*. At his suggestion I afterwards called at the Zoological Society's Rooms to see the type of Hutton's new species, of which a drawing was being then prepared for publication, and it was undoubtedly of the same form.

In a paper read before the Wellington Philosophical Society in September, 1894, I wrote:—

When I had the privilege of placing before you on July 25th last a budget of ornithological notes, I took occasion to refer to Professor Hutton's supposed new species of Petrel from the Kermadec Islands, to which he had given the name of *Œstrelata lecuophrys*, and, following Mr. Salvin, I then stated my belief that, instead of being a distinct species, it was only a form of *Œ. neglecta*. We have not had to wait long for confirmation of this view. I have the pleasure of exhibiting to-night a pair of birds kindly lent to me for that purpose by Mr. Bethune, the second engineer of the 'Hinemoa.' The male bird is in the plumage of Professor Hutton's *Œstrelata leucophrys*, whilst the female is in the ordinary plumage of *Œstrelata neglecta*. They were taken by Mr. Bethune himself from their breeding-burrow on Sunday Island. Indeed, Mr. Bethune assures me that on every occasion he can remember—and he has collected many of these birds in the breeding season—he has found the two kinds mated and breeding together. From this it might be inferred that the difference of plumage is sexual. As against this view, however, I have to exhibit a specimen in an intermediate state of plumage, the sides of the head and neck being very prettily rayed with dusky grey; also an example with a still whiter head than Mr. Bethune's male bird presents. All this goes to prove the correctness of Mr. Salvin's contention as to the variability of this species in regard to plumage. It is perfectly clear, therefore, that *Œstrelata leucophrys* will not stand as a species. . . . . .

At the same time that I submitted my specimens of *Œ. neglecta* to Mr. Salvin I showed him also a pair in entirely dark plumage, which seemed to me to belong to a distinct species, and which, in that case, I proposed to dedicate to Captain Fairchild, who has done so much to increase our knowledge of the birds inhabiting the outlying islands. Mr. Salvin expressed a strong belief that these were referable to *Œ. neglecta* in a dark phase of plumage, and said that nothing would satisfy him to the contrary short of finding the dark-coloured birds nesting together apart from the lighter-coloured birds, and breeding true. I felt bound to defer to the opinion of a naturalist who had made the Petrels his special study, so I abstained from recording this supposed new form. The two specimens which I exhibit to-night seem to prove that, in this case also, Mr. Salvin was right in referring the bird to *Œstrelata neglecta*. In one of them the entire plumage is brownish-grey, darker on the upper surface, changing to brownish-black on the wings and tail; the primaries, secondaries, and tail-feathers being white in their basal portion, with white shafts, darkening towards the tip. In the other specimen the under surface is much lighter, whilst on the throat there are indications of a change to the pale-grey characteristic of ordinary specimens of *Œ. neglecta*. I think, therefore, we may pretty safely assume that this is the young state of that species.

In Mr. Bethune's two specimens now exhibited the wing measures, from the flexure, exactly 11·75 in.; in my intermediate example it measures 12 in., and in the more matured one only 10·5 in. In the two entirely dark birds the wing, as in the first-named, measures 11·75 in. The dark birds have brownish-black legs and feet, whereas in all the others the tarsi are yellowish, and the toes 'sandalled' with black; but this difference is no doubt due to the immaturity of the former.

In a later communication I wrote :—

I find that, in quoting Mr. Bethune in relation to this species ('Transactions New Zealand Institute,' vol. xxvii., p. 133), I rather overstated what he had said. He informs me that, although he saw many of these birds mated in the breeding season, as a matter of fact he 'collected' only one pair—the specimens which I had the pleasure of exhibiting at the meeting of our Society on September 5th last. But, as far as he could observe, the two phases of plumage were always associated; so that my general argument is not affected in any way. But, as Mr. Bethune is a very careful observer, I am anxious that he should be reported with strict accuracy. On another point also I appear to have misunderstood him. This species, he assures me, does not deposit its eggs in a burrow, like so many of the other Petrels, but places them in an open depression on the surface of the ground.

I have in my collection a series of four specimens from Sunday Island, one of the Kermadec Group, which appear to bear out completely Mr. Salvin's view as to *Œstrelata leucophrys* (of Hutton) being only a condition of that species. They are all of pretty nearly the same size. No. 1 is in the ordinary uniform dark plumage of *Œ. neglecta*. No. 2 has whitish throat; breast, sides of the body, and abdomen white. No. 3 has the forehead and lores whitish; throat, sides of the head, and the whole of the fore-neck pale-grey and white intermixed, the former colour assuming the shape of small crescents on the cheeks and lower part of throat; feathers on vertex and crown with obscure, narrow margins of greyish-white; nape and hind neck inclining to greyish-white, being paler than the rest of the upper-surface, but without any markings. No. 4 is in the perfect plumage of the so-called *Œ. leucophrys*. No one examining this series critically could come to any other conclusion than that they all represent one and the same species in various states of plumage.

Mr. Bethune afterwards sent me the following note: "Three varieties of this Petrel are known on Sunday Island by the name of the Summer Surface Mutton-bird. This is the only name that the Bell family (the principal collectors) have for it. They do not make any distinction between the light and the dark varieties. This species was laying when we were there in November. It lays its egg on the surface of the ground: hence the name."

Captain Hutton writes to me (October 7th, 1902) :—

I have received the following interesting information from Captain Bollons in answer to my enquiries about the Mutton-birds of the Kermadecs:

The White Titi (*Œ. neglecta*) commences to breed early in November, inland, on ridges; does not burrow; young covered with white down. First plumage resembles the adult; throat white, breast and back of the neck speckled.

The Black Titi (*Œ. phillipi*) commences to breed late in November, on the coast, on the edges of cliffs; does not burrow. Young covered with greyish down. First plumage like the adult, all black.

Evidently this is not a case of dimorphism, but of incipient species. Whether they should be called varieties or species is a matter of opinion; but the difference should not be lost by lumping them as one species. I have not yet found out through him anything about *Œ. leucophrys*, but it also will probably have different breeding habits.

Bollons can be relied upon. I have found him most accurate.

Captain Hutton writes to the Zoological Society :—

Mr. Cheeseman informs me that *Œ. neglecta* is certainly the winter Mutton-bird of the Kermadec settlers, which is said to be breed only on Meyer Island and other outlying rocks during the winter months, the young being ready to depart when the true Mutton-birds arrive at the end of August. Mr. Cheeseman says that at the time of his visit (August, 1887) the slopes of Meyer Island were crowded with nearly full-grown fledglings sitting at the roots of the trees. At his approach they uttered hoarse cries and endeavoured to escape by rolling down the hill, the old birds circling about among the trees above his head. . . . Mr. Cheeseman also informs me that some of the young birds were dark-coloured, but closely resembled the old ones in plumage. Mr. Bell says that the Winter Mutton-bird breeds from May to September, and that its egg is rather larger and rounder than that of the true Kermadec Mutton-bird.

Off the Tasmanian Coast, in March, 1904, I saw several Petrels which appeared to me to be *Œstrelata neglecta*. They are powerful on the wing and fly high, often in pairs, crossing in front of the ship, and never astern like many other species, such as *Procellaria cinerea*.

ŒSTRELATA GULARIS.

(MOTTLED PETREL.)

Œstrelata affinis, Buller, Birds of New Zealand, vol. ii., p. 223.
Procellaria gularis, Peale, U.S. Expl. Exped., p. 299 (1848).

The bird of the first year differs from the adult in being generally darker in plumage. The whole of the upper surface, the sides of the breast, the sides of the body, flanks and abdomen, dark slaty-grey, the feathers very minutely margined with paler. Chinpure white; lores, lower sides of face, fore-neck, breast, and under tail-coverts white, varied with slaty-grey, in freckled wavy lines on the breast. All the median wing-coverts are stained with brown; the inner webs of all the quills pure white, as also are the larger under wing-coverts. Bill black; legs and feet yellowish-brown (in dried specimen).

I have in my collection a pair of these birds brought from the Auckland Islands. There is no appreciable difference in the plumage of the two sexes; but in the male bird the speckled markings on the forehead are more conspicuous, whilst there is a richer tinge of brown on the arm of the fore-wing. I have received several specimens from the provincial districts of Canterbury and Otago. The characters by which I distinguished *Œ. affinis* are constant in all these examples. Dr. Otto Finsch, without seeing the bird, proposed to unite it to *Œstrelata mollis*; but the late Mr. Osbert Salvin, our great authority on Petrels, on comparing my bird with the large series of the latter species in the British Museum, unhesitatingly agreed with me that it was quite distinct; but he suggested that it might prove to be the same as *Œ. gularis* (Peale), of which an unique example existed in the United States. On comparing this species with a specimen of *Œ. mollis* from Sunday Island, the following external differences are at once manifest: the bird is somewhat smaller; the upper surface is slaty-grey, instead of blackish-brown; the lower part of breast and abdomen are dark cinerous, with barred markings on the sides of the body, instead of this surface being almost entirely white; the tail-coverts are white in their whole extent, instead of being slaty-grey; there is a broad blackish band along the edge of the wing, within which the entire lining is pure white, instead of being grey and white intermixed, and the inner vanes of the primaries are pure white, except at the tips; the legs, instead of being distinctly "sandalled," as in the other species, are dull-yellow, with brown toes and interdigital webs.

Later on, however, Mr. Salvin wrote in the 'Catalogue of Birds' (vol. xxv., p. 415):—

> With Mr. Rothschild's permission, I sent a New Zealand specimen of *Œ. affinis* (Buller) to Washington, to be compared with Peale's type of *Œ. gularis*. Mr. Ridgway writes to me concerning them as follows: 'I have carefully compared the bird (*i.e. Œ. affinis*) with the types of *Œ. gularis* (Peale) and *Œ. fisheri* (Ridgw.), and have no doubt whatever as to its being of the same species as the former, as you supposed it to be. The type of *Œ. gularis* has the plumage saturated with oil from the skin, and is therefore considerably discoloured, the upper parts being much darkened, and the grey of the under parts browner than in the Rothschild specimens. Making due allowance, however, for this, the plumage is practically identical; while the measurements (which were taken, the two specimens one immediately after the other) are as near the same as possible.'

Mr. Cheeseman showed me, at the Auckland Museum, a fine specimen of this Petrel which he had obtained from Taupo. And Mr. Percy Seymour, writing from Preservation

Inlet, after giving the description of a Petrel which fits in exactly with that of *Œstrelata gularis*, says: "I have found a hill where these birds breed. I found two specimens dead and mutilated; and my dogs caught a third, but pulled most of the tail out. I took measurements of this one, but did not preserve it, as I intended to make a camp in a cave near the breeding-ground and collect a number. I visited the place at intervals, and the birds were just cleaning out their burrows (February), when some mining business called me away to another part of the district. However, I hope to get specimens next season. The burrows were very deep, and it would scarcely be practicable to collect a single specimen and return to the hut under eight or nine hours, unless a track were first cut through the dense bog-pine—a week's work, I suppose."

ŒSTRELATA COOKI.
(COOK'S PETREL.)

Œstrelata cookii (Gray), **Buller, Birds of New Zealand, vol. ii., p. 217.**

I find that the size of this species is variable, a specimen sent to me by Mr. Reeves, of Mokohinu Island, measuring in the wing, from flexure to the tip, only 8·2 in. Bill ebony-black; legs and feet yellowish-grey, shading into greyish-black on the outer toe; webs darker.

In the whole romance of bird-life there is perhaps nothing more remarkable than the manner in which this Petrel and the tuatara (*Sphenodon punctatum*)* habitually share the same burrow, the lizard championing the nest and fighting for its possession, when molested, like a veritable dragonet! (See my full account, vol. ii., p. 218.)

ŒSTRELATA FULIGINOSA.
(SOOTY PETREL.)

Œstrelata fuliginosa (Kuhl.), **Buller, Birds of New Zealand, vol. ii. p. 221.**

Unfortunately I have obtained no specimens, and have nothing to add under this head.

* This lizard is so abnormal in its character that it forms by itself a distinct Order of Reptilia and exhibits the most bird-like skeleton of all existing reptiles. It is perhaps generically the oldest inhabitant of the earth, being closely allied to the *Prohatteria* of the Permian period, its closest relations being the various forms of *Rhyncocephala*, which occur in the Trias. It still exists, but in greatly diminished numbers, on the rocky islands adjacent to the New Zealand coast. It is comparatively common on the Hen and Chickens, on Cuvier Island, on the Poor Knights, on the Mercury Islands, and on the Barrier Islands, in the Hauraki Gulf. Coming further south, it occurs on the Alderman Islands, on Motunau or Plate Island, on the Island of Karewa in the Bay of Plenty, on the Rurimu Rocks, on Whale Island, and on East-Cape Island. It likewise inhabits the various groups of islands in Cook's Strait, such as Stephen's Island, the Brothers, and the Chetwyn Islands. The last recorded specimen from the mainland was captured in Evans Bay, near Wellington, about the year 1842, and coming into my possession, twelve years later, I presented it to the Colonial Museum.

ŒSTRELATA AXILLARIS.

(SALVIN'S PETREL.)

Œstrelata axillaris, Salvin, Ibis, 1893, p. 264.

This is a very interesting addition to our list of native species. In the collection of birds made by the late Mr. Hawkins at the Chatham Islands, there were two specimens of a Petrel allied to *Œstrelata cooki*, but differing in several marked characters, notably in having black axillary plumes. Mr. Salvin states that "the skins were not quite adult, but were marked male and female. The birds had been shot on the south-east island on the 8th May, 1892."

A specimen of this rare Petrel, hitherto recorded only as from the Chatham Islands, was picked up, not long since, on the Wairarapa plains, where also stray individuals of *Prion desolatus* are often found, driven inland by stress of weather.

The plumage of this Petrel is so singularly like that of *Prion* that we may, I think, regard it as a case of mimicry for protective purposes. The two genera are perfectly distinct, but, as we get better acquainted with the species, we shall probably find that this Petrel hunts with the communities of *Prion* that are so common in our seas. I confess I was completely deceived myself, for the moment, when the late Mr. Salvin handed me a specimen for examination without saying anything. What protection is gained in the struggle for existence by this curious resemblance of plumage can only be a matter of speculation till we know more about the habits and general economy of these birds. But why are the axillaries black?

ŒSTRELATA PHILLIPI.

(PHILLIPS' PETREL.)

Œstrelata phillipi, Gray, Ibis, 1862, p. 46.

Captain Hutton, who has made a special study of the Petrels of the Southern hemisphere, and probably knows more about them than any of us, considers this to be a distinct species. In his paper already referred to (' Proc. Zool. Soc.,' 1893, p. 755) he says:—

> I have little doubt but that this bird is the same species as the Norfolk Island Petrel of Governor Phillips. It approaches another species, *Œ. neglecta*, but can be distinguished by the shape of the white on the inner web of the primaries as well as by its colours. Having examined three specimens, which, although varying slightly in colour, are constant in this respect, I have no hesitation in admitting it as distinct. Mr. Cheeseman informs me that he did not see this species at the Kermadecs, and knows nothing about its breeding habits; but Mr. Bell sent him specimens with the Summer Mutton-birds, so that it probably breeds with them from September to November. The Norfolk-Island Petrel is said to form burrows in the sand.

Dealing with the theory of dimorphism, as illustrated by this species, Captain Hutton says:

If we reject the idea of dimorphism as improbable, and that of change due to age as disproved, we have three different hypotheses to chose from to explain the facts:

1.—Two distinct species, sometimes producing hybrids.

2.—One excessively variable species, one form producing, in an irregular way, the other.

3.—Two species developed by ordinary variation going on for a long time, while the intermediate forms have not become extinct. . . .

For my part, I strongly incline to the last hypothesis, which is more in accordance with what we know in other cases, and, as I think, offers the best explanation of the facts as at present known. For I cannot but think that *Œ. neglecta* and *Œ. phillipi* are two closely related species, while *Œ. neglecta*, var., is an incipient species, which perhaps does not always breed quite true.

It is doubtless of this species that a newspaper correspondent gives the following interesting account:

In countless thousands they reach their breeding ground in Phillip Island and the neighbourhood, on the eastern coast-line of Victoria, within a few hours of the same date every year. Some idea of the gregariousness of these birds is given by Captain Waller, of the 'Westralia. He states that on one occasion, while on the journey between New Zealand and Australia, he steamed for thirty miles through solid flights of Mutton-birds, extending to a distance of three or four miles on each side of the vessel. Occasionally they settled on the water, and when they did that they covered the surface and looked like a reef of black rocks. They were on their way to the Victorian coast, to occupy their nests on the land.

OSSIFRAGA GIGANTEA

(GIANT PETREL.)

Ossifraga gigantea (Gmelin), **Buller, Birds of New Zealand, vol. ii., p. 225.**

In my budget of ornithological notes communicated to the Wellington Philosophical Society on October 21st, 1891, I said: "Of this fine Petrel, several remarkable examples have lately come under my notice. The specimen exhibited, which is an almost pure albino, was captured a few weeks ago off the coast near Kaikoura. The general plumage is white, but there are widely scattered feathers of the normal colour. There is a similar specimen in Mr. S. W. Silver's fine collection of New Zealand birds at Letcombe Regis, near Wantage. There is on board the 'Hinemoa' the skin of another which was shot by the chief steward, off the Snares, about a year ago. In this the dark feathers are fewer, or more widely scattered, and the bill is of a yellowish horn-colour. Captain Fairchild tells me that for a long time past he has observed a perfectly white one at the Bounty Islands: but it is a very shy bird, and hitherto has kept well out of gun-range."

Since the above was written I have received another beautiful albino which was shot at sea about ten miles north of Milford Sound.

Mr. Napier Bell, the well-known Civil Engineer, in a letter from Perth, Western Australia, says: "Two islands here are the home of the Giant Petrel. This bird is as large as a goose, and of a dark slate-colour. I saw one which flew on board one of the dredges at Fremantle and dropped into the hopper, which is a great compartment where the dredge deposits its dredging; but, as this dredge is worked by suction from pipes laid to the shore, the hopper is unused and full of water. The bird has lived there quite contentedly for a month, and refuses to leave the hopper. It is fed every day, swims about in the water, and roosts in the iron girders."

I do not know a better instance of dimorphic colouring than in the case of the Giant Petrel, or Nelly. I have on several occasions commented upon the frequency of white Nellies. Generally they have widely scattered slaty-black feathers all over the body; occasionally the entire plumage is pure white, as in a beautiful specimen in my collection from the Bounty Islands. The late Captain Fairchild, to whom I was indebted for this bird, assured me that he had more than once observed several white ones in the air together, and I have had the same account from Mr. Bethune, the Chief Engineer of the Government steamer. Sometimes, however, they are of a uniform whitish grey colour. Mr. Jennings informed me that on his last visit to Macquarie Island he observed more white Nellies than dark ones. They were breeding at that time, and he specially noticed that the young of the white Nellies were likewise white. This, of course, is a very important point, and seems to settle the question of dimorphism in this species.

Almost every collection of New Zealand birds in the Colony possesses one or more white specimens. There are some beautiful examples in the Hon. Walter Rothschild's Museum at Tring. In the Natural History Museum at New York there is a specimen with a few widely scattered slaty-black spots. It is marked as "from the Maximilian collection," but no locality is assigned to it.

Major Alexander, C.M.G., Private Secretary to H.E. the Earl of Ranfurly, wrote to me on March 4th, 1902: "It will interest you to know that, on our recent trip to Macquarie Island, we shot two white Nellies, after pursuing them for two whole days. They are really splendid birds. I believe one was shot by Borchgrevink at the Antarctica. The Governor sent one of his to the British Museum and the other to Tring. At the Auckland Islands we also got a brace of *Merganser australis*—the only ones we saw. Owing to the stormy weather off the Bounties, we were unable to procure any more *Phalacrocorax ranfurlyi*."

Mr. Salvin says: "Young birds are much browner, and often white about the head, but their plumage is changed for the uniform dark chocolate-brown of the adult. Nearly white individuals are not uncommon. Lat. Southern Seas, north to about lat. 30° S."

In my diary for 1893 I find mention of a solitary *Ossifraga gigantea*, on the afternoon of March 19th, after passing the Falkland Islands; and in my diary for 1898 occurs the following passage:

> Off Samoa, October 29th. We have now been nearly a month at sea in these tropical latitudes and we have seen practically no birds at all. To-day I saw a large dark Petrel in the distance—to all appearance *Ossifraga gigantea*—and yesterday a Plover of some sort hovered round the ship. Between New Zealand and Tonga, on October 12th and 13th, I saw a few *Diomedea exulans*, in the dark plumage of immaturity, but no adult birds. On the 14th I saw a single Pintado Petrel (*Daption capensis*).

I have a record of seeing several of them coursing about our ship, on February 25th, when about twenty miles eastward of Kerguelen's Land. These are the only references to the Giant Petrel I can find in all my ocean journals, so I conclude that its habit is not to travel far away from the land.

DAPTION CAPENSIS
(PINTADO PETREL.)

Daption capensis, Linn.; **Buller, Birds of New Zealand, vol. ii., p. 215.**

Captain Hutton writes (under date December 1st, 1902: "The Cape Pigeon probably breeds at the Snares, Auckland Islands, and Antipodes, although the nest has not yet been found."

The following paragraph appeared, some years ago, in one of the Wellington papers: "It is not very often that Cape Pigeons are seen in our harbour, and the presence of these pretty sea-fowl is always looked upon as the harbinger of bad weather. The passengers of the 'Duco,' on her trip to the 'Rimutaka,' in the stream yesterday, saw one of these 'Pigeons' floating near the liner, having probably followed her into port."

HALOBÆNA CÆRULEA.
(BLUE PETREL.)

Halobæna cærulea (Gmelin), **Buller, Birds of New Zealand, vol. ii., p. 214.**

This species of Petrel, although plentiful in certain localities elsewhere, is very rarely found on the New Zealand coast. Dr. Kidder writes that, "upon first landing on Kerguelen Island (September 13th), the hillsides, apparently quite deserted during the day, became at night perfectly alive with these birds and a species of *Pelecanoides* (*P. urinatrix*, Gm.), flying irregularly about the rocks and the hummocks of *Azorella*, and filling the air with their call. The note much resembles the cooing of Pigeons, consisting of three short notes repeated in rapid succession and followed by two long ones, thus: 'Kuk-kuk-kuk-coo-coo.' They seemed rarely to fly over the water, but to confine themselves to the neighbourhood of their burrows, sometimes alighting and again taking wing, very much as if there were legions of bats inhabiting the hill. I never succeeded in satisfying myself as to the object of this constant flight during the night, although I spent much time in watching them, since, so far as my observation extended, there were no night-flying insects whatever upon the island, nor did the structure of the stomachs of these birds seem fitted to an insect diet. The burrows are excavated beneath the mounds of an umbelliferous plant which abounds on the Kerguelen hillside (*Azorella selago*, Hook.), growing in dense masses of often several feet in diameter. The holes usually run straight inward for a foot or more, then turn sharply to the right or left, parallel with the hillside, thence downward, often doubling once or twice upon themselves, and communicating with other entrances. At the bottom is an enlarged cavity, lined with pine-root fibres, twigs, ferns, or leaves of the 'Kerguelen tea' (*Acæna affinis*, Hook.), and quite dry. Here the single egg is to be found, always quite covered with dry

powdered earth or the leaves above mentioned. The diameter of the burrows at their entrance is about that of a man's wrist. Upon our first arrival two birds, male and female, were usually found in each burrow during the day. After they began to fly, however, but a single one was to be found with the egg, usually, but not always, the female. When set free in the day-time, the mode of flight was irregular, as if the light were confusing to the birds. They always alighted in the water after flying a mile or so. The noise of their calling was incessant during the night, coming quite as often from the burrows as from the air, but it became much less frequent after the middle of November, from which I infer that the call is connected with the season of pairing. The egg is white, single, and measures 1·9-2 in. by 1·45-1·55 in. The first egg was found on October 23rd, although doubtless they begin to lay earlier. A young bird covered with slate-coloured down was found on November 12th, and frequently thereafter. The traveller who should visit Kerguelen Island only during the day, returning to his ship every night, might easily fail to observe the presence of these birds at all, since, in the neighbourhood of their burrows, they are exclusively nocturnal in their habits, being perhaps the very latest to appear after nightfall. They are, however, often seen at sea during the day, many hundreds of miles from land."

My only specimen of this graceful Petrel was obtained at Cape Campbell; and there is another in the Auckland Museum, taken on the coast of the North Island. I know of no others, and this will indicate how rare this species is with us.

PRION VITTATUS.

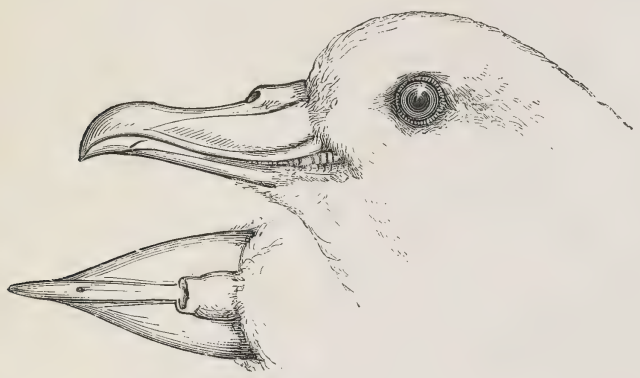
(BROAD-BILLED DOVE PETREL.)

Prion vittatus (Gmelin), **Buller, Birds of New Zealand, vol. ii., p. 212.**

I have nothing fresh to add to my account of this well marked species, specimens of which are now to be seen in all the great museums.

Mr. Salvin says ('Cat. B.,' xxv., p. 433):

This species has the evident bill of all the Prions, and the lamellæ of the maxilla show plainly when the bill is closed.



PRION VITTATUS.

PRION DESOLATUS.

PRION BANKSI.

(BANKS' DOVE PETREL.)

Prion banksii, Gould; **Buller, Birds of New Zealand, vol. ii., p. 211.**

This form has a dark stripe down the sides of the neck, from the eyes, far more prominent than in the other species.*

Specimens in the Colonial Museum exhibit a good deal of variation in the contour of the bill, some having the unguis much deeper and more robust than others.

Nestling.—Covered with very dark sooty-grey down, looking, when at rest, like a round ball of fluff. It is easily distinguished from the young of *Prion desolatus* and *P. ariel* by its broader bill.

Prion banksi was collected off Victoria Land, lat. 74° S., by Dr. (now Sir) J. D. Hooker, in 1840. This is the first record of the species from the Antarctic region.

According to Captain Hutton, this species breeds on the Auckland Islands.

PRION DESOLATUS.

(DOVE PETREL.)

Prion turtur, Kuhl.; **Buller, Birds of New Zealand, vol. ii., p. 209.**
Procellaria desolatus, Gmelin, Syst. Nat. i., p. 562 (1788).

According to Dr. Ramsay, this species is found occasionally on the New South Wales coast and breeds on Montague Island.

It is thus distinguished from its allies by Mr. Salvin:

Similar to *P. vittatus* and *P. banksi*, but with a still smaller bill than the latter; the sides of the maxilla are nearly straight, not convex, and the lamellæ are not visible near the rictus when the bill is closed. ('Cat. B.,' xxv., p. 435.)

Mr. Lyall writes to me from Stephen's Island: "The Dove Petrels are here in thousands; the ground is covered with them as thick as they can find sitting room. They begin to assemble as soon as darkness sets in, and the noise they make is something astonishing."

According to Captain Hutton, this species breeds on Antipodes Island.

I have some nestlings, obtained on the outlying rocks off the Chatham Islands. They are covered with pale slaty-grey down, long and soft in texture.

* Very similar in colour to *P. vittatus*, but the bill not so wide (0·5 in.); the lamellæ of the maxilla just visible near the rictus when the bill is closed. (*Salvin*, 'Cat. B.,' xxv., p. 434.)

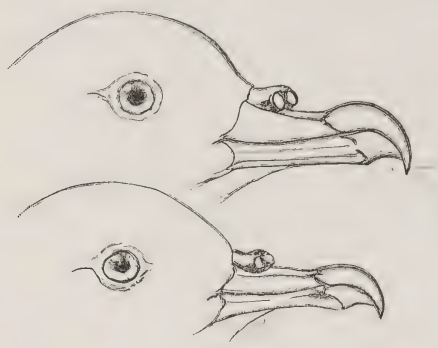
PRION BREVIROSTRIS.

(SHORT-BILLED DOVE PETREL.)

Prion brevirostris, Gould, P.Z.S., 1855, p. 88.

When Mr. Salvin, in 1893, was characterising his *Œstrelata axillaris*, from the Chatham Islands, he called my attention to the remarkable external resemblance of this form to *Prion desolatus*, the body being only a little larger, the plumage darker, the bill black, and the axillary plumes black instead of white.

Just before my departure from New Zealand, in 1889, I purchased from Mr. W. Smyth, the well-known taxidermist in Dunedin, a supposed *Prion desolatus*, which had been taken on the



PRION BREVIROSTRIS AND P. DESOLATUS.

Otago coast. I detected at once an important difference in the bill, which was more like that of *Œstrelata*. I brought the specimen to England with me and, with Dr. Bowdler Sharpe's assistance, made a careful comparison of it with the large series of Prions in the British Museum. We both came to the conclusion that it was inseparable from Gould's *Prion brevirostris*, well represented in the Museum, which had hitherto been referred to *P. desolatus*. At first sight it seemed as if this was an even more remarkable case of mimicry than Mr. Salvin's *Œstrelata axillaris*, the two birds being quite indistinguishable except for the bill. On relaxing the skin, however, to enable me to inspect the mouth, I discovered, under the magnifying glass, the peculiar lamellated structure which characterises the genus Prion. That Mr. Gould, however, was justified in separating this species from *P. desolatus* will, I think, be made sufficiently manifest by the above illustration of the two heads (from a drawing by Mr. Keulemans), the upper figure representing this species and the lower one the well-known *Prion desolatus*.

Mr. Gould's type came from Madeira; but there are specimens in the British Museum from Kerguelen's Land, Australia, and New Zealand. The Prions habitually consort in large flocks, and no doubt this species will yet prove to be very abundant in the New Zealand seas. The late Professor Kirk wrote:

> In 1891 I visited the Snares, and was filled with amazement at the number of Petrels that made their appearance on the approach of evening. From the surface of the sea to the greatest height at which it was possible to distinguish them they were to be seen in myriads, and gave me such an idea of their vast numbers as I had never before been able to realise; while their rapid but graceful evolutions were a never-ending source of pleasure. The scene reminded one of the countless vistas of stars opened to the eye of the observer through a good telescope, or, perhaps better still, of the ever advancing and receding hosts of bacteria to be seen in infusions under a high power of the microscope.

PRION ARIEL.

(GOULD'S DOVE PETREL.)

Prion ariel, Gould; **Buller, Birds of New Zealand, vol. ii., p. 213.**

As stated in the footnote to my account of this species (vol. ii., p. 213), Dr. Sharpe, in his memoir on the Zoology of Kerguelen Land ('Phil. Trans.,' vol. 168, p. 101), had expressed his opinion that this *Prion* was nothing but the young of *P. desolatus*. I ventured to take a different view, my examples, being, as I believed, perfectly mature birds.

The species has since been accepted by Salvin in the British Museum Catalogue, and is therein thus differentiated:

Adult.—Similar in colour to the other species of *Prion* but with a paler crown, hardly differing from the tint of the back; the spot below the eye also paler and less conspicuous; the terminal dark band of the tail wider; the bill much narrower and more compressed, though the unguis is as large as those of the other species; the sides of the mandible are nearly straight, and the lamellæ feebly developed and quite invisible when the bill is closed.

Hab.—Madeira (perhaps accidental) and the Southern Seas generally, between lat. 35° and 60° N.—(*Salvin,* 'Cat. B.,' xxv., p. 435.)

[In the Southland Museum there are two unmistakable specimens of *Prion ariel,* the bill being perceptibly smaller than in *Prion desolatus.*]

PELECANOIDES URINATRIX.

(SMALLER DIVING PETREL.)

Haladroma urinatrix (Gmelin), **Buller, Birds of New Zealand, vol. ii., p. 227.**

This is the smallest form of Diving Petrel. It occurs on the coasts of both Islands, and also at the Chatham Islands, and on the Snares. I have a fledgling from the last-named locality, in which the wing, from flexure, measures under four inches.

Dr. Finsch says ('Ibis,' 1872, p. 248) that *Pelecanoides berardi* was brought from the Chatham Islands by Mr. Henry Travers. Dr. Coues recognises this species; but Dr. Sharpe writes: ('Trans. Ven. Eped.,' 1874-5, p. 116): "My conclusions differ from those of Dr. Coues, insomuch that I consider that *P. berardi* is nothing but the young of *P. urinatrix*." Mr. Salvin also considered the two birds identical; so I have decided to drop *P. berardi* from my list.

A specimen (adult male) in my collection gives the following measurements: length, 7·75; wing from flexure, 4·25; tarsus ·8.

Sir Wyville Thomson writes (H.M.S. 'Challenger,' vol. i., p. 359): "It is to be seen on the surface of the water in Royal Sound, when the water is calm, in very large flocks. On two days, when excursions were made in the steam pinnace, the water was seen to be covered with these birds in flocks, extending over acres, which were black with them."

Dr. Coppinger, in the 'Cruise of the Alert,' records capturing a specimen of *P. urinatrix* on the west coast of Patagonia.

This is the species about which Mr. Moseley writes from Kerguelen's Land: "A Petrel that has given up the active aërial habits of its allies, and has taken to diving and has become specially modified by natural selection to suit it for that changed habit, though still a Petrel in essential structure."

Mr. M. J. Nicoll met with this Diving Petrel in the Straits of Magellan and in Smythe's Channel. He writes: "The stomach of this species is very large and soft, and is apparently little more than an enlargement of the proventriculus, having no visible muscular system; those examined were filled with fishes."

A circumstance that has not yet been recorded is that some examples of this Petrel have a pungent natural odour—very different from the ordinary Petrel-smell—resembling that of a wild goat, and so inherent in the plumage that I have been able to detect it in a preserved specimen after a lapse of five years or more.

PELECANOIDES EXSUL.

(LARGER DIVING PETREL.)

Pelecanoides exsul, Salvin, Cat. B. Brit. Mus., vol. xxvi., p. 438.

This is the larger form of Diving Petrel, of which I have received specimens from Stephen's Island and from the Island of Karewa, in the Bay of Plenty.

Ad.—Length, 8 inches; wing from flexure, 4·5; tarsus, ·8; bill, along the ridge, ·55, along the edge of lower mandible, ·9; breadth of bill at end of nasal tube, ·25.

This species occurs on the Auckland Islands.

It is thus distinguished by Mr. Salvin ('Brit. Mus. Cat.,' xxv., p. 438):

Adult.—Similar to *P. urinatrix*, but the feathers of the sides and middle of the throat with a distinct subterminal grey bar; flanks mottled with grey, each feather with a grey shaft; under wing-coverts also grey, with white edges and dark shafts.

Mr. Gould, in his 'Birds of Australia,' includes *P. garnoti* from Peru as a synonym of *P. urinatrix*, in which he is followed by Dr. Coues; but Dr. Sharpe considers that *P. garnoti* "must be held to be distinct on account of its very much larger size."

Mr. Salvin also recognises that spec es as distinct.* It has not yet been recorded from New Zealand; but it is one of those species that may reasonably be looked for there.

On this point Prof. Newton sends me the following note:—

There seems to be no evidence at present as to the occurrence of *P. garnoti*, the largest species, with you, but it would not surprise me if it were to turn up. All Petrels are puzzling in almost every way—habits, distribution and what not. I take it that Salvin has solved some of the puzzles; but I doubt whether, with all the trouble he has taken, and all the opportunities he has had, he himself would admit that he had completely disposed of all the difficulties of determination.

DIOMEDEA EXULANS.

(WANDERING ALBATROS.)

Diomedea exulans, Linn.; **Buller, Birds of New Zealand, vol. ii., p. 189.**

In volume xxi. of 'The Transactions' of the New Zealand Institute, there is a paper by Mr. A. Reischek on 'The Habits and Home of the Wandering Albatros.'

The author of the paper, having visited the Antipodes and Auckland Islands in the Government steamer 'Stella' during the breeding season of that species, seems to have enjoyed exceptional opportunities for studying its history in the adolescent state. But, unfortunately, through an obvious inaccuracy of observation, he entirely failed to give us any very definite information on the only point that presented any difficulty.

He says (*l. c.*, p. 128): "The Albatros takes five years to become fully matured, and in each year there is a slight change of plumage. The young, which are hatched in February, are covered with snow-white down, *and a beautiful specimen in this stage exists in the Otago Museum.* In the following December they lose their down, and the plumage is of a brown colour, with white under the wings and on the throat. In the second year the plumage is the same, except that there is more white on the throat and abdomen. In the third year there is still more white, although mixed with blotches of brown. In the fourth year they very nearly acquire the full plumage. The male is white with a few very fine dark specks, except the wings, which are dark-brown. In the fifth year they reach their full growth, and the mature plumage is displayed—white with blackish-brown wings."

Mr. Reischek's account of the nestling agrees with Mr. Gould's, which is as follows: "The young are at first clothed in a pure-white down, *which gives place to the dark brown colouring mentioned above*" ('Hand. Birds of Australia,' ii., p. 433).

* This much larger species is thus discriminated by Mr. Salvin (*l. c.*, p. 439):—

P. garnoti, *Less.*—Voy. Coquille, i., pt. 2, p. 730.

Adult.—Similar to the preceding species but considerably larger; entire under surface pure white; flanks and axillaries dusky-grey; inner surface of the tarsi, middle and inner toes yellowish-hazel; outer side of the tarsus and outer toes darker. Total length about 9·5 inches, wing 5·7, tail 1·65, bill 1·2, tarsus 1·35, middle toe 1·4, outer toe a little shorter, inner toe 1·1.

Hab.—West Coast of South America from Callao to Valparaiso.

But the specimen in the Otago Museum to which Mr. Reischek refers is not, as his remarks would imply, a nestling covered with white down, but a well-grown fledgling, with tufts of white down still adhering to the plumage. This fledgling has not assumed "plumage of a dark-brown colour," but is of pearly whiteness. It is thus described in my second edition of the 'Birds of New Zealand' (vol. ii., p. 192): "A fledgling, however, in the Otago Museum—obtained at Campbell Island—is entirely without the dark plumage. It has not yet completely lost the dense, fluffy, pure-white down which forms the clothing of the nestling. The head, neck, shoulders, rump, tail, and entire under-surface are of the purest white, having a fine silky gloss; the interscapular region is traversed longitudinally with club-shaped marks of greyish-black, increasing downwards, the larger feathers having their apical portion completely covered; upwards, towards the shoulders, these marks diminish till they become mere arrow-heads; on the mantle there are numerous marginal bars, but there is no vermiculation. The wings are brownish-black on their upper surface, varied with white, all the coverts having white margins, and the quills are black. Bill yellowish horn-colour, with a bluish tinge on the upper mandible."

This is undoubtedly the "beautiful specimen" referred to by Mr. Reischek, because Professor Parker mentions in a letter to me that he had called his attention to it specially after his return from the Auckland Islands. Its condition is quite inconsistent with Mr. Reischek's account of a direct transition from the snow-white down into the dark plumage. It seems to me unfortunate that, with such excellent opportunities for studying the subject, Mr. Reischek did not place that matter beyond all doubt.

As to its requiring five years for the Albatros to attain the mature white livery, this must of necessity be only conjecture. In my account of the bird I have described no less than ten phases of plumage in its progress towards maturity. That it takes a considerable time—probably several years—to develop the fully-adult plumage is perfectly clear, but it is manifestly impossible to fix the annual changes of plumage without having the birds constantly under observation.

Nestling.—Covered with short and thick down of a purplish-grey colour, which fades away to white on the head and upper part of neck.

Dr. Kidder in his Report on the Birds of Kerguelen Island, published in Washington, in 1875, says (p. 20): "All the nesting Albatroses that I saw, without exception, showed a slight pinkish discolouration of the neck, as if a bloodstain had been washed out, usually on the left side, and extending downwards from the region of the ear." Dr. Bennett, in his 'Gatherings of a Naturalist in Australia' alludes to "a streak of delicate rose-tint" on each side of the neck, which fades after death. Mr. Sanford, in a communication to the *Zoologist* (1889, p. 387) writes: "I have never seen any mention of the beautiful rose-coloured powder which covers the white parts of the adult or nearly adult *D. exulans* in December; this comes off on a handkerchief, but is evanescent, or rather it changes to a dirty brown colour in the preserved skin. In this respect it resembles, to a certain extent, the rose-colour of *Caccatua leadbeateri*, and that on the breast of the Great Red Kangaroo of Australia in the breeding season, though the fading in these animals is less than in the Albatros. The beak is also of a delicate rose-colour at the same season. . . With regard to the food of *Diomedea exulans*, I caught several of these during my voyage to Australia in the sailing ship 'Anna Robertson,' in the year 1857, and skinned and dissected them. Without exception, I found in the stomach the beaks of large cuttlefish, apparently Calamaries. The beaks were quite as large as those of large *Octopi*, 4 ft. long, which I have dissected; and I have frequently seen the birds lift some large object from the water, which might well have been the animals to which the beaks belonged."

The late Captain Fairchild brought in from near the Chatham Islands (early in September) two birds, apparently male and female, in both of which the blood-red mark, first described as above, was visible on the sides of the neck. This character cannot, therefore, be a sexual one, although it may be peculiar to the breeding season.

I have already mentioned* the tame Albatros which lived so long at Government House, in Wellington, under Mr. Gillington's assiduous care. Brought there as a down-covered nestling, having the freedom of a small enclosure, and being fed almost exclusively on fish, it had developed in four months into a fine bird in perfect first-year's plumage. But there is a still more remarkable instance of the kind. It could hardly be expected that this bird would live long when removed from its natural environment; but Mr. Martin Chapman, of Wellington, succeeded in keeping a pair of young ones alive in his garden for many months. They had become perfectly tame when I saw them and would feed readily on raw or cooked meat. They were brought from Antipodes Island and were of different ages. The younger one was a large-sized fledgling; body covered with thick woolly down of a pale grey colour, standing out prominently on the head where the colour is somewhat lighter; feathers on back, wings and breast, black; bill, white; feet, pale grey. The other was in the first year's plumage—dark grey, with white face and throat. The survivor of these partook freely of fat beef, and had an inordinate appetite. It was usually docile, but, on being provoked, would snap audibly with its mandibles.

Captain Fairchild informed me that when visiting the Brothers and Stephen's Island in the month of June, in perfectly calm weather, he saw at least six hundred Albatroses resting on the water, and that from the anchorage off the latter island he counted as many as a hundred. He said he had noticed that during a period of five years, from 1889, they had been getting more and more plentiful off the New Zealand coast. Prior to that he never saw more than a straggler now and then, and generally at Flat Point, about midway between Wellington and Napier.

A specimen received in the flesh from Captain Fairchild, who took it himself off the nest with a nestling beside it, is a parti-coloured bird, in what I take to be the intermediate or transitional plumage, perhaps that of the second or third year, or even later. Upper surface blackish-brown, darker on the wings and tail; band across the forehead, immediately above the bill, with the whole of the face and throat pure white; neck and fore-part of breast sooty-brown, paler on the anterior edge, broken and freckled on the lower margins; lower part of breast and abdomen pure-white, largely freckled on the sides of the body with brown; flanks, vent, and under tail-coverts sooty-brown; wing-feathers black with white shafts; lining of wings pure-white, varied with black on the outer edge; tail-feathers black, the shafts white at the base. This bird had no white markings on the upper surface of the wings.

The following cutting is from the 'Sydney Morning Herald':—

With reference to a paragraph which appeared in a recent issue respecting the rescue of a seaman who fell overboard from the ship 'Gladstone' while on her voyage from London to this port, we have been supplied with the following interesting additional particulars by Captain Jackson himself: On October 24th, at noon, whilst the ship was in latitude 42° and longitude 90° E., and going at the rate of about ten knots an hour, the cry of 'A man overboard' was raised. Captain Jackson and his chief officer, Mr. John Rugg, who was seated at dinner at the time, immediately rushed out of the cabin and rounded the ship to. A boat, manned by four hands, was then lowered, and left the ship in charge of Mr. Rugg five minutes after the alarm was raised. The man was then out of sight, but the rescuing party pulled towards the spot where it was supposed he had fallen, and after some little time found him clinging to an Albatros, which he was using as a lifebuoy. As soon as the boat got within a few yards of him he let the bird go and swam to the boat, being apparently none the worse for his unexpected immersion. He returned on board smiling, and stated that just after he fell an Albatros swooped down upon him and made a peck at him, but he seized it by the neck and kept its head under water until he had drowned it, and then used it to preserve his own life in the manner already described. The boat was away about one hour. The sea was very rough at the time, and the wind was from the north-west. The most remarkable thing about this extraordinary story is that the man, who could only swim a little, had heavy sea-boots on at the time of the accident, besides being encumbered with oil-

* *Trans. N. Z. Inst.*, vol. xxvii., p. 121.

skins. The names of the crew of the boat were Messrs. W. Gilchrist, L. Mann, Richard Simpson, and John Murphy, the first two of whom are Sydney men. The Albatros was the first that had been seen for a month.

Mr. Pycroft writes ('Trans. N.Z. Inst.,' vol. xxxi., p. 145): "I have seen this bird several times at the mouth of the Bay of Islands, and I am told it often enters the little harbour of Whangaruru during the whaling season in search of offal."

Between Tonga and New Zealand we were often followed by *Diomedea exulans*, but mostly young birds. We saw only one *Diomedea regia*. This was about the middle of October. After passing the Great Barrier we saw a community of *Prion desolatus* fishing near the surface, also a single *Garodia nereis*, and, opposite to the Little Barrier, what appeared to be an albino *Majaqueus* looming very distinct in the uncertain light of the evening.

This species breeds on the western end and centre of Adam's Island, on the Auckland group, and on Antipodes Island (Hutton).

A well-known writer says, with great truth: "The ocean solitudes are to-day, owing to the method of following beaten tracks which is so universally pursued, more solitary than they have been for centuries." The only effective way, therefore, of studying the habits of the Wandering Albatros is to visit it during the breeding season, in its great nurseries in the Southern Ocean, where its life-history reads like a romance.

Under the title of 'A Remarkable Fast,' Mr. James Buckland has communicated to 'The English Illustrated Magazine' a picturesque account of the home life of this noble bird, from which I extract the following:—

> The Wandering Albatros! Theme of poets! The wonder and the admiration of naturalists! Whether we think of it as a thing of surpassing grace, adding dignity even to the ocean, or ponder upon the marvellous features of its domestic economy, what bird can be compared to this pilgrim of the sea? There is a certain indefiniteness and mystery connected with the habits of the Wandering Albatros which gives it a character widely different from that of any other bird. For the most part, we see it alone in infinite space, apparently insusceptible of weariness, and possessing the power of dispensing with sleep for very long intervals. Throughout our waking hours it is with us, our solitary companion in a boundless waste of waters. The sombre shades of night come and pass. Day dawns, and still it is there—following the vessel with sober, steady flight. Or it may suddenly appear, sweep once round the ship, and, pursuing its majestic course, retreat as it came—to vanish meteor-like and for ever from our sight. Small wonder the voyager should ask, Whence comes it, whither goes it, how sleeps it, homeless and shelterless as it seems to be?
>
> Where is the man who has rounded the Cape or the Horn—the Northern Hemisphere does not know the Wandering Albatros—who has not looked upon the marvellous flight of this bird with feelings of interest amounting almost to enthusiasm; and where is he who can say that the phenomenon has failed to maintain its power to interest even after weeks of observation have made it familiar? Now the stately bird hangs in the wake of the steamer, perfectly motionless, except that its head from time to time is turned slowly from side to side, as if carefully noting all that is taking place on board; now it tops the white crest of a mountainous wave, to go sweeping into the indigo valley beneath; now, dropping astern, it wheels in wide circles far behind; now, having retreated to a certain distance, it puts forth its full power of flight, and, coming up again with the steamer, shoots past with almost incredible swiftness. Yet in the flight of the Albatros—be the weather calm, or be the rigging shrieking in the fury of a gale—there is scarcely any perceptible movement of its expanded pinions. When a quick turn or a wide curve is required, it alters merely the angle at which the wings are inclined. Watch one of these birds as closely as you may the long day through, and you will detect no other motion but this. Various theories have been propounded from time to time to account for the sailing flight of the Albatros; but, when all that can be has been said, science has little to tell us but that there is an unusual development of the muscles of the breast and wings. The exact nature of the guiding and impelling force has never been satisfactorily explained. It is perhaps worthy of mention that, despite its prodigious power of sailing in the air, this bird has great difficulty in rising from the water. This is particularly the case when there is little wind and the sea is calm. When there is a broken sea, it takes a preliminary run along the water to get the required impetus, and rises with the wave. Then, after a few fast strokes with its mighty pinions, it pursues its motionless course as if impelled by some invisible power. . . .

At the other side of the world, surrrounded by the greatest extent of ocean on our globe, and at a distance so remote from other lands that man rarely visits them, lie scattered several groups of uninhabited islands. Search in your atlas to the south of New Zealand, and you will find these desolate shores marked as little dots and called respectively—I mention those only which the Wandering Albatros seeks for the purpose of reproduction—Antipodes Island, Auckland Islands, and Campbell Island. There is no lighthouse on these islands, and, as they are frequently enveloped in heavy fog—to say nothing about the treacherous currents which swirl round them—they are best known through the many and fearful shipwrecks which have occurred there. The land is mountainous, and for the most part the shores rise in bold and naked grandeur. What bays there are, are fringed with dense bush, above which grows a belt of wind-pressed thicket denser still. Beyond this, stretching away and upward to the summits of the hills—which in some cases reach an altitude of two thousand feet—the country is covered with a heavy growth of tussock grass. A desolate land, yet, strange to say, a land filled with a glory of wild flowers. Exaggerated marguerites with rich purple centres, wondrous asters, gorgeous gentians, golden lilies, and a dozen other rare and beautiful flowering plants, blaze here as if to mock the tempest-ridden shores with a semblance of peace. Sea-lions and seals, tamer even than cows in a meadow, frequent these islands in vast numbers. But, beyond all things, it is the land of the bird. Here, upon naked rocky shelves overlooking the water, Penguins, Mollyhawks, and Petrels congregate in such countless hordes that the stench from their 'farms' pollutes the air, while the clamorous and melancholy cries which they continuously utter drown the roar of the sea. No attempt could be successfully made to tell in figures the myriads in which these birds swarm. When seen flying to and fro against a pitchy black background of gathering storm-clouds, they are like nothing so much as the whirling flakes of a heavy fall of snow.

The tussock grass on the uplands is so high and rank as to make it extremely difficult for one to force his way through the tangle. You stumble and fall continually—or 'just as you get up you fall down again,' as I once heard a sailor express it—and often take several hours to scramble over a distance of one mile. But not until you have passed through a tough struggle with this fearful grass, and have reached the higher ground, do you catch your first glimpse of the Albatros. Then their pure white heads and necks, which are noticeable objects in the coarse herbage, greet your delighted eye.

Seen at close quarters, the Albatros seems to have increased greatly in bulk. We now discover its body to be much larger than that of a swan, and its expanded wings to measure in some cases as much as seventeen feet from tip to tip. But the glory of the Albatros has departed. Nothing can be grander than its flight at sea; nothing can be more ungainly than its waddle on land. To add to the pitifulness of the sight, the noble bird which we remember to have seen sailing over the deep, far out of our reach, is at our mercy now. The wings that defy space cannot smite. The only sign the bird can give of defence when approached is to clap its beak in a ridiculously helpless manner.

The Albatros builds always far up the hillsides, on grass-covered declivities which slope towards the sea. It is obvious that it selects situations of this description that it may be able, by running downhill, to get sufficient impetus to rise upon the wing. It collects in such places in prodigious numbers, dotting the hills with little points of white. During the early part of the breeding season the birds stand in pairs, or in small groups, bowing to each other, touching their bills together, whispering much that would, I have no doubt, look very silly in print, and bowing again; and all the while, although you stand within a few paces of them, remaining as indifferent to your presence as a couple in Hyde Park.

The nestling is fed assidiously until it becomes so grossly fat that it exceeds a full-grown bird in weight. It is then deserted by its parents, who set forth to roam the winter through over thousands of miles of trackless ocean, often accomplishing in their wanderings the circumnavigation of the globe. October has dawned before they return.

And now I have arrived at the remarkable feature in the domestic economy of the wandering Albatros which gives the title to this paper—a feature so extraordinary that the long list of natural-history wonders may be searched in vain for a parallel. How does the young bird receive food during the absence of its parents? *It does not receive any!* During the whole time—a period often longer than four months—it lives solely on its own fat! In this there is no assumption whatever. Naturally, the nestling is incapable of flight, and in ninety-nine cases out of every hundred the situation occupied by it makes it impossible to get to the water in any other way. That being the case, the conclusion is incontrovertible.

Nor is the marvellousness of this prolonged fast fully realised until we have looked more closely into the matter. The necessity of food is proportional to the rapidity of the circulation of the blood. In the case of animals which hibernate, the pulsations of the heart during the torpid state decrease considerably, and the

demand for nourishment diminishes in the same proportion. Now, the young Albatros continues actively alive! Again, animals which hibernate burrow into the warm earth, or are otherwise snugly ensconced. The long winter through the young Albatros, sitting in an open nest on a bleak hillside, is exposed to the terrific violence of an almost unbroken succession of the fiercest gales that ever rushed out of the great void of an ocean! Lastly, hibernates are lean and emaciated when they emerge in the spring. The young Albatros, after its fast of four months, is lively and in good condition!

That a tender nestling should be able, under such adverse circumstances, not only to exist but to thrive and to become a lusty fledgling is matter enough to excite our astonishment; but what perhaps is more wonderful still is that the parent birds should thus desert their young. It cannot be want of food that takes them away, for the waters which wash their island home are teeming with oceanic mollusca and small crustaceans—their natural food. Neither can their departure be ascribed to an impatience of cold, for the great ocean solitude to which they repair is, at this time of the year, the most bleak and wintry stretch of water upon our globe. We are able, in a measure, to understand the reason why birds migrate; but what is the motive which prompts the Albatros to wander—an impulse so strong that it conquers the fondest tie on earth, the attachment of a parent to its offspring? No one knows. It is an unfathomable mystery.

When, directed by some secret instinct which defies our understanding, the old birds return over the pathless deep to their far-away desolate home, each pair goes at once to the old nest. After a little fondling of the young one—which meanwhile has gone no further from its nursery than to stand immediately beyond the margin of the encircling drain to exercise its growing wings—they unceremoniously bundle it out and proceed to repair the structure.

The fledgling by this time is dark-slaty grey with, perhaps, little tufts of down still adhering in places to the plumage. But it is still far from being able to fly. Its babyhood is long, and it remains for some months yet in the immediate vicinity of the nest, evincing in many pretty ways its fondness for its truant parents. As time progresses it takes short trips to sea; but not until the following year does it fly from the cradle of its infancy. Then, in company with its parents, it launches into space and traverses the world.

I have omitted Mr. Buckland's description of the conical nest, because he has mistaken the nest of the Mollymawk for that of the true Albatros.

Much has been written, from time to time, about the mechanical principles involved in the flight of the Albatros (see vol. ii., pp. 193-195), one of the chief contributors being Captain F. W. Hutton, F.R.S., now Director of the Canterbury Museum. His last notes on this subject are to be found in 'The Ibis' for January, 1903, accompanied by some interesting diagrams which, by his permission, I reproduce, with the following extracts from his paper:—

In the Pliocene period Albatroses inhabited the North Atlantic Ocean; but at the present time they are practically limited to the North Pacific, as far south as 20° N., the coast of Peru, and the Southern Ocean between 30° S. and 60° S. Several are dark in colour when they are young, and get whiter as they grow old; and this points to the probability of *D. nigripes*, of the North Pacific, which remains dark throughout life, being nearer to the prototype Albatros than any other species now living. . . .

One of the most peculiar and characteristic habits of the Albatroses—as well as of all the larger Petrels—is their so-called 'sailing' method of flight, which enables the birds to keep on the wing all day with very little exertion. Of course, it is not true sailing, but some word is wanted to distinguish it from the soaring of Vultures, Pelicans, and other birds. For the flight of the Petrels is performed near the surface of the sea, and the birds make irregular curves with such sharp turns that their outstretched wings are, when turning, in an almost perpendicular position (see fig. 1). Vultures, when soaring, ascend to a considerable height, and then whirl round and round in great circles, always keeping their wings horizontal.

Sailing flight depends, of course, upon the principle of the inclined plane. The bird acquires momentum by flapping its wings, and then, holding them extended and motionless, waits until its momentum is nearly exhausted, when it once more propels itself forward as before. In the case of the Sooty Albatros, the interval may, under favourable conditions, be about half an hour, and the difficulty is to explain why the friction of the air does not sooner bring the bird to a standstill. It was pointed out in 1889 by Mr. A. C. Baines * that

* 'Nature,' vol. xi., p. 9; and Lord Rayleigh, *l. c.*, p. 34.

the birds usually rise in a slanting direction against the wind (fig. 3), turn round in a rather large circle, and make a rapid descent (fig. 4) down the wind. They subsequently take a longer or shorter flight in various directions, almost touching the water. After that comes another ascent in the same manner, followed by

FIG. 1.—ALBATROS TURNING SHARPLY TO THE LEFT.

FIG. 2.—ALBATROS RISING AND TURNING TO THE RIGHT.

another series of movements. Now, as the velocity of the wind near the surface of the sea is diminished by the friction of the waves, when the bird ascends into the more rapidly moving upper current its *vis inertiæ* makes the wind blow past it, and so its stock of energy is increased. When it descends it will be moving faster than the lower stratum of wind, and will again develop new energy if its *inertia* is sufficient to prevent

FIG. 3.—ALBATROS COMMENCING TO RISE.

FIG. 4.—ALBATROS DESCENDING AND MAKING A BROAD CURVE TO THE LEFT.

its attaining the new velocity of the wind at once. So that the bird must fly against the wind when ascending and with it when descending. Thus the energy constantly lost by the friction of the air is partially renewed by these manœuvres. This explains why the birds can sail longer in a high wind than in a calm. It is because in a high wind and with a high sea there is much greater difference between the velocities of

the wind near the surface and a short distance above it; and this, again, is an explanation of why an Albatros keeps so close to the surface of the sea, only just topping the waves and occasionally rising high in the air.

The foregoing sketches (figs. 1-4) are copied from enlarged photographs, the only good ones out of many failures. The difficulty of photographing flying birds from the deck of a rolling ship, often vibrating considerably, is great, and I have also found that the sea makes a very bad background; my most successful attempts were therefore made at birds above the horizon.

In this connection I ought to quote an interesting paper by Sir James Hector, F.R.S., 'On the Anatomy of Flight of Certain Birds' * :—

The means by which the Albatros maintains its remarkable flight for long periods and at all various angles to the wind without any apparent recovery of its initial velocity by the flapping of its wings has been the subject of much controversy. It has always appeared to me that it might not be altogether a subject in the domain of mathematical physics, as has been assumed, but rather that it might be a difficulty for the anatomist to solve with his scalpel. In 1871 I made some attempts, assisted by my friend, Sir Walter Buller, to dissect, after injecting the arteries and veins, the wing of the Albatros, conjecturing that, as such birds are rarely obtained in the flesh in the Northern Hemisphere, some structural differences might have escaped notice. We were not very successful on that occasion, excepting that I believe we discovered that the long tendon extending from the extensor muscles that control the folding-up and expansion of the wing (*extensor plica alaris*) terminated in tendinous fibres which, supplemented by muscular fibres, grasped the quills of the large pinion-feathers, and might perhaps impart to them a reciprocal motion like the feathering of an oar. It was difficult to conceive how these muscles could perform two such difficult functions as were involved in the expansion of the wing as a whole and at the same time to exercise a control over its distal appendages. I was therefore not surprised when the result of the dissection of several fine specimens in the flesh preserved in spirit, and which I submitted through Sir Walter Buller to authorities in London, pronounced against there being any unusual anatomical structure present.

Lately I have had an opportunity of re-examining the wing of a large Albatros in the flesh, and find the following peculiarities, which, so far as I know, have not been hitherto recorded: the extensor muscular tendon, instead of being attached as in other birds only to a fixed process at the distal extremity of the humerus, is also attached by a subsidiary offset to a projecting patelloid bone which is articulated with the process, and thence proceeds to the radial carpal bone, and thence onward along the radial aspect of the manus, where it expands into fibrillæ that embrace the quills. When the wing is fully extended, the thrust of this projecting process on the elbow-joint causes a slight rotation of the ulna on the humerus, so that the joint becomes locked, which renders the wing a rigid rod as far as the wrist-joint. At the same time the slight play permitted by the articulation of the patelloid bone on the process allows of the transmission of the muscular pull from the shoulder to the manus without unlocking the joint. By this mechanism the sustaining diameter of the bird is enormously increased without any increase of weight. In an Albatros of ordinary size the rigid surface presented to the atmosphere like a parachute would have an extension of 10ft. Beyond this on either side is the true efficient pinion of the bird, erroneously called the tip of the wing, which, as all who have closely watched the flight of this wonderful bird know, is ever in motion, sometimes flapping on the surface of the sea as it dips to a wave, or elevated as it turns in the force of the gale, and, though no doubt difficult to observe, it is in constant quiver of slight rotation of the broad plumes, opening and closing like Venetian blinds. We have in the mechanism thus described a sufficient source to sustain the prolonged, and to the casual observer apparently effortless, flight of the Albatros. The locking of the elbow-joint in the Albatros is exactly analogous to the locking of the knee-joint of the human skeleton by which man maintains without fatigue that erect attitude which proclaims his supremacy.

It is very much to the point that the only other bird which possesses a patelloid bone controlling the elbow-joint as the patella does the knee-joint is the Penguin, and in this case the wing-bones have also to be kept rigid during the Penguin's flight under the water.

* *Trans. N. Z. Inst.*, vol. xxvii., pp. 285-287.

The following account of the nesting of the Albatros has been published by Mr. L. Cockayne, the botanist, who visited the Islands, in 1903, in the Government steamboat 'Hinemoa':—

The heights of Adam's Island—the most southern of the Auckland group—are famous as being the nesting ground of the Albatros. Unfortunately, and to the great regret of my companion, Mr. Jennings, of the Dunedin Museum, the half-hour allowed on Adam's Island was too short to climb 2,000 feet in quest of the young Albatros in its down, but we had plenty of opportunity to make their acquaintance both on the mountains of Campbell Island and on the low ground of Antipodes Island; on the former island it is the Royal Albatros and on the latter the Wandering Albatros. The bird lays one egg, and, in course of time, the chicken appears, and it remains on the nest for twelve months, being presumably fed during that time by the old birds [see page 132]. As a person approaches a nest in mid-winter the young bird raises itself up to its full height, say some two feet or so, its downy plumage rivalling the snow patches in whiteness, and snapping its beak at the intruder. On Antipodes there were hundreds of these lovely creatures within a few acres. The nests are usually in the most exposed places, and the gales of these southern islands are something to remember.

The following is from my diary for 1894, recording observations on an ocean voyage round the world:—

26th February.—Saw yesterday, for the first time during the voyage, the young of *Diomedea exulans*, in slaty plumage with white face. Surprise has often been expressed at the relative fewness of the dark-coloured Albratroses as compared with the white-plumaged ones. But the explanation is a very simple one. There are two closely-allied species of Wandering Albatros (*D. exulans* and *D. regia*), one of which is white at all ages. Supposing, therefore, that a pair of each has one young one, the proportion of white birds to dark in the two families will be as five to one—that is to say, two adult *D. exulans*, two adult and one young *D. regia* (all of these white), to the one young *D. exulans* in dark plumage. In addition to the four species of Albatros, we have to-day *Majaqueus parkinsoni*, but no *Prion desolatus*. We have now 'the brave west wind' right aft, with the sea mountains high, and a very rough sea does not suit the Dove Petrel. The manner in which numbers are cast ashore on the strand after every heavy gale is sufficient proof of this. At noon to-day—three hundred miles from land—a Skua (*Megalestris antarctica*) passed twice round the ship, and returned later in the day to complete the inspection, flying high, and in a very hawk-like manner. *Priofinus cinereus* in great numbers to-day. Their flight is an easy one, alternately soaring and skimming, with very rapid evolutions, and they seem rarely to descend to the water to pick up food. In calm weather they look very pretty as they wheel about simultaneously in a large flock, their white underparts gleaming in the sunshine. Among the Sooty Albatroses (*Phœbetria fuliginosa*) following the ship one exhibited a broad white patch on the nape.

Almost every public museum in the world possesses one or more specimens of the Wandering Albatros, because no general collection is considered complete without it. I remember, several years ago, presenting a very fine one (mounted in a glass case) to the Cambridge University Museum. It was so inconveniently large that its location became a serious difficulty; but, in the end, the Director wrote to me that as museums were for the display of exhibits, he would rather enlarge the bird-gallery than decline the gift! In the Colonial Museum, Sir James Hector had one mounted, to its full extent, in the attitude of flight. It was of course a very effective object, but the wall-case had to be considerably enlarged in order to accommodate it.

DIOMEDEA REGIA.

(ROYAL ALBATROS.)

Diomedea regia, Buller, Trans. N. Z. Inst., vol. xxii., p. 340 (1890).
Diomedea exulans, Linn.; **Buller, Birds of New Zealand, vol. ii., p. 195 [in part].**

This noble Albatros was introduced by me at a meeting of the Wellington Philosophical Society,* in 1891. And I now quote the account I then gave of it:—

Ad.—Alba, tectricibus alarum nigris vix brunnescentibus, majoribus interioribus plus minusve albis, margine carpali albo et brunneo vario; remigibus brunnescenti-nigris, apicem versus pallidioribus, scapis flavicanti-albidis: scapularibus albis, ad apicem nigris: supracaudalibus caudaque albis, hac nigro apicata, rectricibus exterioribus basaliter brunneo irregulariter marmoratis: subtus pure alba: rostro albido, carnoso vix tincto, ad apicem flavicanti-corneo: pedibus corneo-albicantibus: iride saturate brunnea: annulo opthalmico nigro.

Adult.—General plumage pure-white; upper surface of wings blackish-brown, varied with pale-brown and white along the edges, and with an extensive patch of white on the humeral flexure; primaries brownish-black, with paler tips and yellowish-white shafts; secondaries brownish-black, largely marked with white on their inner webs; scapulars white in their basal portion, black towards the tips; tail-feathers largely marked with black in their apical portion, and the outer ones more or less marbled with brown; lining of wings and under tail-coverts, like the rest of the plumage of the under parts, pure-white. Irides very dark brown, almost black; bare eye-lids jet-black; bill white, with a roseate or pinky tinge in life, yellowish horn-coloured on the terminal hook; legs and feet flesh-white. Extreme length (approximately), 51 in.; extent of wings, 122 in.; wing from carpal flexure, 28 in.; tail, 10 in.; bill, following the curvature of upper mandible, 8·5 in.; length of lower mandible, 7·5 in.; tarsus, 5 in.; middle toe and claw, 7·5 in.

Young.—Similar to the adult, except that there is less white on the upper surface of the wings, although all the coverts have white margins; the interscapular region is traversed longitudinally with club-shaped marks of greyish-black, increasing downwards, the larger feathers having their apical portion completely covered; upwards, towards the shoulders, these marks diminish till they become mere arrow-heads; on the mantle and on the upper tail-coverts there are sometimes marginal bars, but there is no vermiculation. Bill yellowish horn-colour, with a bluish tinge on the upper mandible.

Nestling.—Covered with snow-white down, thick and woolly in appearance, but of extremely fine texture. It is likewise very long, extending to 6 in. on some parts of the body; bill yellow.

Obs.—In the extremely-old male specimen exhibited the tail is entirely white; there is an unusual amount of white on the upper surface of the wings, all the coverts being more or less margined with it; and the scapulars are obscurely marbled with greyish-brown. The feathers composing the mantle are faintly vermiculated. Two heads of *Diomedea regia* were shown to me on board the 'Hinemoa.' In one of these the bill measured from base to tip (following the curvature) 8·5 in.; length of lower mandible 6·5, from the gape 8. The bill in the other was even larger, the upper mandible measuring 8·75 in. and the lower 6·5.

Eggs.—Yellowish-white, sometimes with a darker zone at the large end; ovoido-elliptical, and measuring 5 in. in length by 3 in. in breadth.

* *Trans. N.Z. Inst.*, vol. xxviii., p. 234.

Some years ago I induced the Colonial Goverment to give the late Mr. Reischek a free passage to the Islands in the 'Stella' for the express purpose of studying the Albatroses; but, although an active collector, he was a very unscientific observer, and, so far from doing anything to clear up the confusion, he added to it by his theory of five successive states of plumage! The real points of interest, such as the colouration of the soft parts and the differences in the young and nestlings of the two species, entirely escaped him, and had to be worked out by myself from specimens brought to New Zealand, at irregular intervals, by Captain Fairchild.

As far back as the 13th February, 1885, I had exhibited, at one of the meetings of the Society, a series of specimens of the so-called Wandering Albatros, and expressed my belief that there were two species confounded under the common name of *Diomedea exulans*, one of them being highly variable in plumage, and the other distinguishable by its larger size and by the constancy of its white head and neck (see 'Trans. N.Z. Inst.,' vol. xvii., p. 450). But, although that was the conviction on my mind, I did not feel justified in setting up the new species, and giving it a distinctive name, till I could produce incontestable evidence of its existence.

I afterwards had an opportunity of examining sixteen beautiful examples, of both sexes and of all ages, and I then had no hesitation in giving this new species the rank to which it was entitled. It is undoubtedly the noblest member of this group, both as to size and beauty, and I therefore named it *Diomedea regia*. Of the sixteen examples mentioned above, two (an adult female and a full-grown fledgling) came from Campbell Island, one was brought alive from the Auckland Islands, and the remaining thirteen (most of which were female birds) were taken by fishermen off the New Zealand coast, in the vicinity of Port Chalmers.

In the 'Birds of New Zealand' (vol. ii., p. 195), I treated this bird as the mature condition of *Diomedea exulans;* but that I still had my doubts on the subject will appear from the following paragraph on page 192: "We cannot suppose that the Albatros is first pure-white, then dark-brown, and, after passing through several intermediate states, pure-white again in extreme old age. Nor would it be altogether safe, from the materials at present before us, to construct a new species. I am inclined rather to account for the differences I have mentioned on the supposition of the existence of dimorphic phases of plumage, as in some other oceanic birds."

In the plate facing p. 188, I gave the two forms, the swimming figure representing the fully adult condition of *Diomedea exulans*, and the standing one being the bird since described as new, which is thus referred to in the text (page 192): "Shortly before leaving the Colony, I saw, at Waikanae, a fresh specimen, which had been cast ashore on the coast during a severe gale. It was of small size and evidently a young bird. The whole of the plumage was pure-white without any markings, excepting only the wings, which were black on their upper surface, largely dappled with white, especially towards the humeral flexure; legs and feet flesh-grey. The skin of this bird afterwards came into the possession of Mr. S. W. Silver, of Letcomb Manor, and, with his permission, I have introduced its likeness into my plate of this species, as the back figure standing on a rock."

The two species having been confounded, it may be as well to explain, before proceeding further, that the description given on page 192 of the 'Birds of New Zealand' of a "perfectly mature example," received at the Canterbury Museum, in 1874, relates to *Diomedea regia*, as do also the notes contained in the last three paragraphs of descriptive matter on page 193. The description of the young on page 190, and of the ten successive states of plumage in the progress of the bird towards maturity (*l.c.*, pp. 190-192), relate, of course, to the old-established species, *Diomedea exulans*.

As to the specific distinctness of the two birds there can no longer be any reasonable doubt.

I submitted, at a meeting of the Wellington Philosophical Society, a series of both species. On one side we had three specimens of the common Wandering Albatros (*D. exulans*): No. 1 in the grey plumage of immaturity, with a well-defined white face; No. 2 in a transitional or progressive state of plumage; and No. 3 representing the fully adult state, with the white plumage prettily speckled and vermiculated on the back and sides. On the other hand, we had three specimens of my new species, No. 1 being a full-grown fledgling, with remnants of white down still adhering to the plumage; and Nos. 2 and 3 representing the adult male and female. The latter, I may state, were both taken by fishermen off the Otago coast, whilst the young bird was brought from Campbell Island, where it was captured on the nest.

It was observed at once that the two birds were readily distinguishable. *Diomedea regia* is appreciably larger than the common species, with a far more powerful bill, which differs further in having a broad black line along the cutting-edge of the upper mandible. In *Diomedea exulans* even the adult birds are more or less marked or mottled with brown on the crown; in *Diomedea regia* the head and neck are pure-white from the nest. In *Diomedea exulans* the bare eyelids are greenish-purple; in *Diomedea regia* the eyelids from youth to maturity are jet-black. In all other superficial respects the two species are alike; but they keep quite apart on their breeding grounds, and do not commingle except when sailing and soaring over the mighty deep, where a community of interest and a common pursuit bring many members of this great family together. So far as I am aware, their breeding habits are the same; but I was able to exhibit to the meeting an egg of *Diomedea regia*, from Campbell Island, alongside of the egg of *Diomedea exulans*, from the Auckland Islands. There is a manifest difference in size, as might have been expected. I do not, however, attach any special importance to this, knowing how variable the eggs of the Albatros are as to size. Nor, indeed, can we look for anything very remarkable in the habits of this bird to distinguish it from the common species. There can be no doubt, however, that this Royal Albatros is the one singled out for special mention in the following passage in my 'Birds of New Zealand' (vol. ii., p. 195):—

> On my last voyage from the Antipodes, by direct steamer by way of Cape Horn, I made careful observations on the Albatroses that followed us. During the first few days from the New Zealand coast (middle of March), and in lat. 56° S., some twenty or more of *D. exulans* were in daily attendance. Nearly the whole of these were in the dark plumage characteristic of the young birds, the fore-neck, breast, and upper parts of the body being of various shades of chocolate-brown, and the face, throat, and abdomen pure white. In some the brown on the breast was very pale, and in one or more of them was reduced to a mere cloud of speckled markings. One bird, however, and the only one in the white body-plumage mentioned above, was conspicuous among the group. It had the head, neck, back, and all the under-parts of the purest white; and the upper surface of the wings blackish-brown, with a broad white patch at the humeral flexure. It was a bird of considerable size—larger, indeed, than any of the others—and seemed to take much wider sweeps over the ocean, and often approached so near to the stern of our ship that I could detect the pinky flesh-colour of the beak. Its tail was white, with what appeared to be a terminal band of black. In long. 126°, the weather being bitterly cold, all the Albatroses had left us. But three days later, lat. 56° '22 S., long. 107° 9′ W., a pair of young birds (in brown plumage) came up to us about noon; and on the following day (March 21), with a stiff gale blowing, an old one appeared in the midst of a flock of Petrels, but did not remain very long. The last appearance of this species was on the 22nd March, lat. 56°, long. 88°, when two birds (one of them in the young plumage) joined us about noon and followed our ship till dark. At this time we were steaming before the wind at a great rate, our log having registered a run of 320 miles for the previous twenty-four hours.

The late Captain Fairchild, of the 'Hinemoa,' who had for some years made a close study of the Albatros on its breeding-grounds, had long maintained that there were two species. Originally he was of opinion that the large white-headed form was only to be found breeding on Campbell Island and other places to the south of the Auckland Islands. Until one of his last cruises, indeed, he had never found it breeding anywhere but on Campbell Island, whilst the common species appeared to have exclusive possession of the Auckland Islands, Antipodes Island, and the other islands to the north; and he had always found this species nesting four or five weeks earlier than the other—that is to say, the Campbell Island bird commenced to lay about the end of December, and the Auckland Island bird about the first week in February; in other words, *Diomedea exulans* was commencing to lay in the Auckland Islands just when the larger species was hatching out its young further south. On a later visit, however, to the last-named group, Captain Fairchild found a colony of *Diomedea regia* nesting there, but occupying a separate locality, and quite apart from *Diomedea exulans*. Here, too, in the Auckland Islands, the same

difference in the breeding-times was observable, for whilst the nests of *Diomedea regia* contained young birds, the other species was only just preparing to lay. On February 7th a nest of the latter was discovered containing two eggs (a most unusual occurrence), but all the other nests were empty, or occupied by the young bird of the former season.

Marvellous as it may appear, it is perfectly true that the young birds never leave the breeding-ground till their parents return to refit their nests for another brood. This is the account of it, amply authenticated, given by Mr. Harris, as quoted by Professor Hutton: "At a certain time of the year between February and June—Mr. Harris cannot exactly say when—the old birds leave their young and go to sea, and do not return until the next October, when they arrive in large numbers. Each pair goes at once to its old nest, and, after a little fondling of the young one, which has remained in or near the nest the whole time, they turn it out and prepare the nest for the next brood. The deserted young ones are in good condition and very lively, frequently being seen off their nests exercising their wings. When the old birds return and take possession of their nest, the young one often remains outside and nibbles at the head of the old one until the feathers between the beak and the eye are removed and the skin made quite sore. The young birds do not go far from land until the following year, when they accompany the old ones to sea." The fact is that when the young are left in the nest at the close of the breeding-season they are so immensely fat that they can subsist for months without food of any kind. Professor Hutton attempted to account for the good condition of the young birds by suggesting that they may be nocturnal in their habits (although the old ones are strictly diurnal) and "go down to the sea at night, returning to their nests in the morning"; but Mr. Harris rejected that theory on the ground that the young birds are incapable of flight, and that the situations occupied by many of them make it impossible to get to the water except by that means.

Captain Fairchild has described to me from personal observation the coming home of the Wandering Albatros after its long absence from its island sanctuary, and the peremptory manner in which the young bird in possession is ordered to quit the nest, so as to make room for its successor. The ease with which the old birds find their way to their own particular nest among so many is not the least wonderful thing in this marvellous romance of island life. And when I ponder on these strange facts I can only ask, as I have done before (vol. ii., p. 197), what is that divinely implanted faculty which enables this bird, after wanderings that defy calculation, and perhaps encircle the globe, to find her way back at the right moment, across the pathless deep, to that little speck of rock in mid-ocean where she had cradled her young the season before? Doubtless the same mysterious unerring instinct that guides the Swallow in its annual pilgrimage —that leads the Pipit, without landmark of any kind, straight to her little nest in the grass, amidst miles of waving tussock—that enables the nesting Tern, when she comes back from fishing, to pick out her two painted eggs from amongst the thousands that lie upon the barren rock.

Like its congener, *Diomedea exulans*, this Albatros forms a very rude nest—just a few loose materials collected together in any convenient depression in the ground. The building up of cheese-like nests is confined to the group of Mollymawks.

Since writing the paper mentioned above, on this new species of Wandering Albatros, I have had an opportunity of comparing its nestling with that of *Diomedea exulans*. The former, as already recorded, is entirely covered with down of the purest white; the nestling of *Diomedea exulans*, on the other hand, has a covering of light-grey down, changing to white on the head.

There is a very lovely specimen of the nestling, most successfully mounted by himself, in Mr. Jennings' collection at Dunedin; and I was not surprised to hear that he had, more than once, been offered £20 for it.

The distribution of these Albatroses on their breeding-grounds is very curious. Although Mollymawks are plentiful on the Snares and on the Bounty Islands, neither *Diomedea regia*

nor *D. exulans* is to be found there. On Campbell Island, where *D. regia* reigns supreme, *D. exulans* is never seen. On the Auckland Islands, with the exception of the small colony of *D. regia* nesting at the eastern end of Adam's Island, all the breeding birds belong to *D. exulans*. On the Antipodes Island, again, there are no *Diomedea regia*, and the breeding birds of the other species are, for the most part, in the dark-grey plumage with white face and throat. One of the officers of the 'Hinemoa' told me that he turned many of these dark-coloured birds off the nest and always found an egg, which seemed to him far more elliptical in form than the ordinary Albatros's egg. He noticed, moreover, that sometimes a very dark bird was paired with a much lighter one.

At the time of one of the visits of the 'Hinemoa' to Campbell Island, at the end of February, the eggs of *Diomedea regia* were just on the point of being hatched, the embryo being well developed. As already stated, the breeding season of *Diomedea exulans* on Auckland Islands is somewhat later, for on the same cruise the crew and passengers brought on board some four or five hundred eggs, all of which were fresh enough to be blown.

I have compared male and female specimens obtained on the east coast of Otago, and I can detect no difference whatever between the sexes, except that the male has a somewhat thicker bill. The female may have a little more white on the upper surface of wings, but this character is a variable one.

In the Hunterian Museum at Glasgow, I saw an undoubted example of this species labelled as *Diomedea exulans*. The Curator told me the specimen had been in the Museum many years, and that it was recorded as having come from the Cape of Good Hope.

In the British Museum there are two specimens from Enderby Island in the Auckland group.

The following passage in Cook's 'Second Voyage' probably refers to this species, and, if so, it is without doubt the earliest record of the bird: "In the afternoon of the 21st [January, 1773] being in the latitude of 64° 24′ South, longitude 42° 19′ East, we saw a white Albatros with black-tipped wings."

Some years ago, as I left the New Zealand coast (on September 11th) for Fiji, several birds followed our steamer all day, although it was perfectly calm. One fine *Diomedea regia*—readily distinguishable on the wing from *Diomedea exulans* by the splash of white on the humeral flexure—several of the latter, and also of *Diomedea melanophrys*, were in our wake till nightfall. There were two or three of the Giant Petrel and a few Cape Pigeons. It was a pleasant diversion to watch their aërial movements from the deck of the steamer, and it seemed to me that *Diomedea melanophrys* was decidedly the smartest and handsomest of the whole group, its movements on the wing being peculiarly light and graceful. On the following morning, with a gentle trade-wind blowing, a single Albatros appeared for a short time, and another swept over our stern at noon, and then winged its way off into the watery expanse. We had not another glimpse of bird life till we approached the coral reefs of Fiji. Of course, this in no way surprised us, because it is notorious that as we approach the tropics, sea-birds disappear. Captain Beaumont (of the s.s. 'Flora,' by which I was travelling) told me that in winter he has sometimes carried the Albatros with him as far as the Tonga reefs, but never in the summer months.

On one of my last coastal trips by steamer in New Zealand, from the harbour of Lyttelton till we reached Terawiti Point, near Wellington Heads—the sea being quite smooth—we were followed by about twenty Albatroses which appeared to belong exclusively to this species, the humeral patch of white being very conspicuous in them all. One of them had all the wings except the quills white speckled with grey. When the bird "seated" itself on the surface of the water to feed and folded up its wings it looked as if it was entirely white.

Mr. W. Smyth, the taxidermist at Caversham, showed me two preserved heads of this

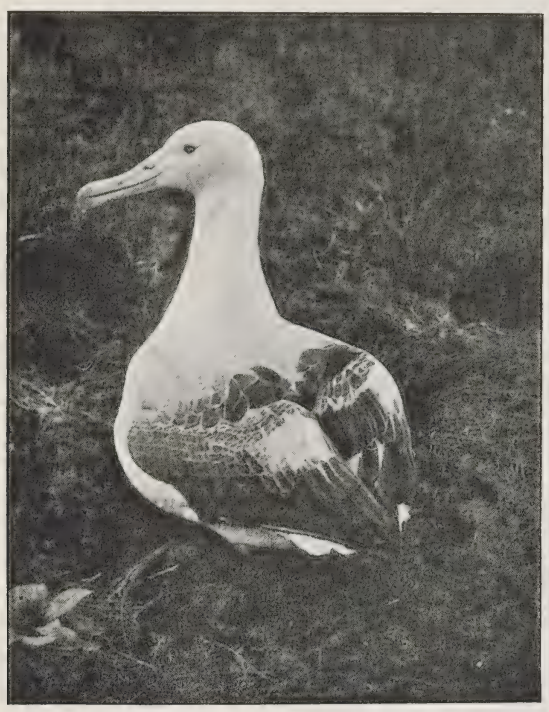
Albatros. In these the bill measured as follows:—(*a*) Along the ridge, 8·75 inches; from the gape to end of lower mandible in a straight line, 6·5 inches. (*b*) Along the ridge, 8·5 inches; from the gape to end of lower mandible in a straight line, 6·25 inches. In both of them the plumage of the head was snow-white; bill yellowish-white with a dark line along the cutting line of upper mandible.

Of the dozen or more specimens of this Albatros collected by Mr. W. Smyth on the Otago coast, all but two were females. The last, however, that I purchased from him is larger than any of the rest, with snow-white head and neck, and is a *male;* so is the young bird from Campbell Island obtained from him, and now in my collection.

A fine specimen from the Auckland Islands measured, in extent, with wings expanded, 9 feet 8 inches. The head and neck are snow white; eye-lids black; irides blue black; bill of an extremely delicate pink, except the hook (upper and lower) which is horn-white; along the cutting edge of the upper mandible a line of black. Feet flesh-white; webs pale pinky-blue.

On being approached this bird stretches up its neck, opens and closes its bill with a loud snapping sound, and occasionally utters a loud guttural note. On the ground it usually rests on the tarsus.

I reproduce here one of Mr. Morris' excellent photographs taken on Campbell Island, because it gives a good idea of the appearance of the Royal Albatros, on shore; besides which it shows well the peculiar arrangement of the black and white colouration on the back and wings. The young bird is generally very fat and very fluffy, both of which characteristics are well shown in the accompanying photograph:



THE ROYAL ALBATROS.

YOUNG OF SAME.

The following entries from my diary, of an ocean trip round the world in 1893-4, may be found interesting in relation to this species:—

On the morning of March 5th, a very beautiful Albatros (*Diomedea regia*) appeared on the scene. It was of enormous size, and wholly white, except the pinions beyond the second flexure of the wing, looking in the

distance like a huge Gannet held against the sky, and so conspicuous in its albinism that it could be readily distinguished among a hundred ordinary birds. So near an approach to perfect albinism I have not before met with among the Albatroses, although, as recorded from time to time, I have obtained several more or less pure albinoes of *Ossifraga gigantea*, one of these having not a vestige of colour on any part of the body. A fellow passenger, however, Mr. William Temple, who came out to New Zealand by the R.M.S. 'Arawa,' informs me that last Christmas, when about half-way between the Cape of Good Hope and Hobart, an exceedingly large Albatros, of snowy whiteness, without a single dark feather of any sort, came up astern, and followed the steamer for some time. The chief engineer was induced to stop the engines for half an hour, and lines were thrown out in the hope of taking this beautiful bird. It came very near being caught; but after one of the ordinary kind had been hoisted on board, the engines were put in motion again and the albino was left behind. These birds are known to live to a great age, and for years to come, in all probability, this majestic Albatros will sweep with its snow-white pinions the dark waters of the South Pacific. Let us hope that at the breeding-season it will repair to one of the great Albatros nurseries periodically visited by the Government steamer 'Hinemoa,' and that Captain Fairchild, who is ever on the look-out for novelties, may have an opportunity of annexing it for science. These 'nurseries' are doubtless a long way off from where the bird was seen, but, as will presently appear, distance is as nothing to an Albatros.

To return, however, to my bird now in attendance on the ship. But for the black-tipped wings this magnificent Albatros might have been the one that so narrowly escaped being hooked by the 'Arawa' passengers. He cruises about amongst the other Albatroses, but always at a distance from the ship. The individuality of this bird is so pronounced that it can be distinguished from the rest at almost any distance, and it will be interesting to note how long it will follow the steamer.

It seems to me that we have not yet solved the problem involved in the flight of the Albatros—a rapid, well-sustained motion, ever against the wind, with scarcely any visible movement of the wings. There are some very sensible observations on the subject in Dr. Bennett's 'Gatherings of a Naturalist in Australasia'; Professor Hutton has grappled with the mechanical principles it rests upon; and the Duke of Argyll has treated the question in a masterly way in his 'Reign of Law.' But, after all, can it be said that the problem has been satisfactorily solved? I think not. Sir James Hector believed, with myself, that it might be explained by some peculiar mechanism in the wing of this bird; and at a meeting of the Wellington Philosophical Society, some years ago, he elaborated a very ingenious theory on the subject, exhibiting at the same time an Albatros-wing specially prepared to illustrate his argument. In 1889 he took the trouble to send to England a fine adult Albatros in spirits of wine for critical examination by an expert. I forwarded it to the well-known comparative anatomist, Dr. Hans Gadow, F.R.S., at Cambridge, but he reported that he could not discover any departure from the normal character in the structure of the wing; and so the matter rests at present. The most remarkable point is that the bird, without any apparent effort—without any visible movement of the limbs themselves—by merely shifting its position so as to alter the angle of incidence, performs an elegant sweep, cutting a great 'figure 8' in the air, and, as Froude puts it, with the adroitness of an accomplished skater on an untouched field of ice. The one thing that surprises one most, next to this marvellous power of sustained flight, is that the Albatros will soar for hours together without once descending to the surface of the water to feed. And yet, if an Albatros should happen to be caught, it immediately vomits an abundance of pure oil, indicating anything but an empty crop. The squid is said to be its principal food; but where does it collect this diet? And, if it is so plentiful on the surface of the ocean, why do these birds so persistently follow ships in search of food?

6th March.—My White Albatros appeared again about 11 a.m. to-day, so that it must have been on the wing during part of the night. There was an easterly gale blowing, and few birds to be seen. I observed some Dove Petrels (*Prion desolatus*), and some other White-bellied Petrels, but too far off from the ship to permit of my identifying them with any certainty. They flew very low, turning often so as to expose the under-side, and were rapid on the wing.

7th March.—About 2 p.m. my White Albatros came up to us again, and coursed about in wide circles as before, but disappeared long before nightfall.

8th March.—There was a heavy south-easterly gale during the night, lasting four hours. It had abated somewhat in the morning, but I did not expect to see the White Albatros again. However, he overtook us once more about 2 p.m., and, after a circuit fully a mile in extent, he vanished in the wide expanse, returning later on, and remaining with us till the close of the day. The only other Albatros seen to-day was a Mollymawk (apparently *Diomedea culminata*), which kept company with the ship for an hour or two, never coming very near, but coursing about among the Grey Petrels, which were less numerous than yesterday.

9th March.—The wind being fair, we made a good run during the night, averaging twelve knots an hour. In the morning there were very few Grey Petrels and no Albatroses. It would seem that the latter rest on the surface of the water during the night, and overtake the steamer next day by following her up in a direct line ; but, seeing the start the ship has got during the night, this performance presupposes a marvellous power of wing, and not of wing only, but of instinctive knowledge of the course to be followed. I can hardly accept Professor Hutton's theory that this is the result of sight, one set of birds mounting high in the air and following the movements of another set of birds nearer the ship ; for example, to-day the atmosphere is hazy, and no power of vision would be of any avail. I watched with much interest for the reappearance of my White

ROYAL ALBATROS ON HER NEST.

Albatros, and, to my delight, true to time—a little after 2 p.m.—he came sweeping up in grand style. Since we first made his acquaintance, on the 5th instant, he has performed a voyage, measured in a straight line, of 970 miles ; but, when the never-ending circles of flight and gyrations in the air are taken into account, probably three times that distance, or, say, 3,000 miles—perhaps even more ! This is one of those incidents in the romance of natural history that set the mind thinking ; and one is quite prepared to accept Mr. Gould's conclusions as to an Albatros being able to encircle the globe in its unwearied flight.

10th March.—When the morning broke the wind had fallen, and there was a haze over the ocean which had not cleared away as the day advanced. I looked out anxiously for my White Albatros at the usual hour, but he did not reappear from behind those misty veils, aad we saw him no more.

For the foregoing illustration of the Albatros on her nest (in Campbell Island) I am indebted to Commander Glossop, R.N., late of H.M.S. 'Lizard,' who kindly furnished me with the photograph. He says that the nest was composed almost entirely of dry tussock-grass, with a neat cavity plastered on the inside with mud, forming, as it were, an enamelled basin. Two eggs which he presented to me are broadly ovoido-elliptical in shape, and creamy-white, with a finely granulate surface. One of these measures five inches in length, by three inches in breadth, and the other is ·25 of an inch broader.

In the above illustration, as in the two preceding ones, the bird seems to have a disproportionately long neck, but this is due to its being stretched up, through fear or excitement, on account of intrusion.

I find the following entry in my private diary:—

On July 9th, when about 700 miles N.E. of the Sandwich Islands, we saw the little Sooty-brown Albatros (*Diomedea nigripes*), of the North Pacific, for the first time. About 4 a.m. on that day the steamer came to a dead stop, owing, it was said, to the over-heating of one of the bolts in the engine-room. I at once went on deck. The sea was as calm as a mirror, and, half an hour later, the sun rose in all his majesty, presenting one of those sublime views that can only be seen at sea. As I watched the placid ocean I saw two birds in the distance making straight for the steamer; on coming close to us, they were joined by a third. They made several courses round the ship and then settled down, in a very dainty manner, on the water. When on the wing, I observed that they occasionally sailed like the Wandering Albatros, but habitually did more flapping with their wings and generally kept very near the surface of the water. They all had a little white about the face, and one of them had a white terminal margin to the tail-feathers. The captain tells me that from this point this form of Albatros generally follows the steamer right up to Vancouver. In the afternoon of the same day there were about eight or ten of these birds following the ship. Some of them had white tail-coverts, upper and lower, one had the whole rump white, and another had the entire abdomen greyish-white. It seemed to me that their habits in every respect were similar to those of the Mollymawk. I observed also that it is only in calm weather that they skim the surface of the water.

DIOMEDEA MELANOPHRYS.

(BLACK-EYEBROWED ALBATROS.)

Diomedea melanophrys, Boie; **Buller, Birds of New Zealand, vol. ii., p. 198.**

In the perfectly adult bird the bill is of an uniform gamboge-yellow, shaded with orange on the hook, and with a very fine line of black around the base of both mandibles; feet delicate blue-grey, darker on the joints and interdigital webs; claws whitish-horn colour. In a fresh specimen of *Diomedea melanophrys* I found the extent of wings to be 81 inches.

This species of Mollymawk breeds at Campbell Island (*Hutton*); also on The Sisters, a group

of rocks lying off the Chatham Islands. According to Mr. Bethune, who is a careful observer, *Diomedea melanophrys* has yellow irides. There is a colony of them on the Campbell Islands, but in such an inaccessible place that they could never get to it from the 'Hinemoa.'

Professor Newton, writing to me on August 17th, 1891, says: "The most startling event I have to tell you of is the killing, some few months ago, of an Albatros in one of the Færoes which—like that which was obtained more than a dozen years ago, off Spitzbergen—is declared to be *D. melanophrys;* but I have a strong belief that both examples, if properly examined, would prove to belong to some North Pacific species. A curious thing about this last bird is that they declare that it has been frequenting the place for some twenty years or more, coming and going every season with the Gannets, with which it more or less consorts."

This bird unfortunately was shot, at last, on Myggenas Holm ('Ibis,' 1896, p. 136), and is now in the Copenhagen Museum. Mr. Harvie Brown has given an account of another killed in lat. 80° N. ('Zoologist,' 1894, p. 337.)

Mr. Sanford writes ('Zoologist,' 1889, p. 387): "A living specimen of *Diomedea melanophrys*, which I kept for some time and brought home, and gave to the Zoological Society, would eat nothing but fish not salted, but he survived a fast of about six days of the voyage, when no fresh fish was procurable. . . . The furthest north I have ever seen any Albatros is about 5° or 6° north of the Cape of Good Hope. *D. melanophrys* reached this latitude in the autumn of 1885, and the Sooty Albatros a degree or two further south, and I have seen at a distance, during the winter, *D. exulans* in Table Bay; but I believe they occur further north."

It is astonishing how destitute of bird life the great expanse of ocean is north of the Equator. The following extracts from my diary for 1894, during a long sea voyage, illustrates this truth:—

1st February.—On reaching our anchorage at Santa Cruz, with the peak of Teneriffe, more than 15,000 feet in height, full in view, we were visited by *Larus marinus;* and till about noon on the following day we were attended on our voyage by the Grey-backed Gull in some numbers. For the rest of the day there was not a sign of life on the dreary waste of waters.

3rd February.—About 10 o'clock this morning I saw a large Petrel, dark-grey on the upper, and white on the under surface, which followed in our wake for an hour or more with a very hawk-like flight. After this, not a wing of any sort nor other sign of animal life till night, when the sea was ablaze with phosphoric displays—sparks and flashes of light—given out, no doubt, by Medusæ and other small invertebrate inhabitants of the deep; but, in addition to this, the whole of the disturbed water seemed luminous, the effect being probably due to the decomposition of animal matter on the surface of the ocean. There had been a breeze from the E.N.E. all day, it was misty in the afternoon, and there was nothing in the way of a sunset. The night was dark, and these phosphorescent effects were very beautiful. Jupiter was resplendent in the heavens, and Sirius shone with his accustomed pale effulgence; but the sparkling lights on the surface of the water, as our steamer ploughed her way through it, seemed more brilliant even than those of the firmament above: everywhere points of light that flashed like sparks from a giant dynamo and expired in a tiny illumination, and occasional balls of lambent flame which dashed past the ship and then dissolved in an instant in the seething foam, reminding one of Coleridge's graphic, although perhaps rather overdrawn, description: 'A beautiful white cloud of foam at momently intervals coursed by the side of the vessel with a roar, and little stars of flame danced and sparkled and went out in it; and every now and then light detachments of this white cloud-like foam darted off from the vessel's side, each with its own small constellation, over the sea, and scoured out of sight like a Tartar troop over a wilderness.' Darwin writes in 'The Voyage of the Beagle' (ed. 1893, p. 154): 'While sailing a little south of the Plata on one very dark night, the sea presented a wonderful and very beautiful spectacle. There was a fresh breeze, and every part of the surface, which during the day is seen as foam, now glowed with a pale light. The vessel drove before her bows two billows of liquid phosphorus, and in her wake she was followed by a milky train. As far as the eye reached the crest of every wave was bright, and the sky above the horizon, from the reflected glare of these lurid flames, was not so utterly obscure as over the vault of the heavens.' Later on, in discussing this phenomenon, he says, 'I am inclined to consider that the phosphorescence is the result of the decomposition of the organic particles, by which

process (one is tempted almost to call it a kind of respiration) the ocean becomes purified.' Although now about a hundred miles from the African coast, a quantity of impalpable red dust was deposited to-day on the ship, all the rigging being more or less tinted with it. It is no doubt composed of minute Infusoria, instances of the kind being not uncommon. I collected a small packet of this red dust on the captain's bridge, and will hand it over to Sir James Hector for microscopical examination.*

10th and 11th February.—No birds, but calm and hot days, with Flying-fish in large shoals. The nights are clear and beautiful, the unusual brilliance of the starlight being no doubt due to the great rarity of the atmosphere. Orion's Belt, to my mind the most beautiful of the constellations, was especially brilliant; and on the evening of the 10th we had our first view of the Southern Cross.

12th February.—The wind strengthened during the night, and now we are experiencing the steady N.E. trades, which will probably go through to the Cape with us. The entire absence of birds is very remarkable, for we have had all kinds of weather: first of all the warm Guinea current, of mysterious origin, running with us; later on the Equatorial current running against us, and then the still waters of the Tropics; at first light S.W. winds in our favour, and now these trade-winds right in our teeth, with a broken sea; and yet no birds of any kind whatever! We have now travelled three thousand miles over this vast solitude without seeing any birds, and Captain Kempson tells me that it is always so. Well may the Arabs term it the 'desert of water.' In the afternoon a dark grey Petrel (of the size and appearance of *Puffinus griseus*) appeared in sight, but did not remain very long. At night the water was phosphorescent again; but we seemed now to have some different kind of animal producing this effect, for they kept as near as possible to the sides of the ship, and the sparks of light emitted presented a green tinge.

25th February.—This morning we were about twenty miles to the eastward of Kerguelen's Land. For the first time on our voyage out the Giant Petrel (*Ossifraga gigantea*) put in an appearance, there being several of them coursing about the ship; also another species of Petrel, a large black bird with whitish bill (? *Majaqueus parkinsoni*), and a number of the true Mollymawk (*Diomedea melanophrys*), their yellow bills glancing in the sunshine as they sailed around the ship. *Priofinus* and *Prion* rather numerous; a single example of my *Diomedea regia*, a few *Diomedea exulans* and *D. melanophrys*, one of the latter having a single white primary in the right wing. As the day advanced the Prions increased to hundreds; but in the afternoon, as we got farther away from the land, they diminished in number and finally disappeared altogether, whilst *Priofinus cinereus* became more numerous. At 8 p.m., there being no moon, but a fair amount of starlight, an *Aurora australis* illumined the western heavens. The phenomenon commenced with the appearance of two comet-like expansions of light, and then changed to a series of huge luminous rays of irregular size, arranged somewhat in fan-fashion, and resting on a bank of clouds. The rays were not persistent, but seemed to change their position and their intensity every few minutes, and there was an entire absence of tint or colour. At the end of half an hour the appearance gradually faded away, and soon afterwards the moon rose.

I may mention that there are several examples of this species, adult and young, in the beautiful Natural History Museum at New York. One, however, labelled *Diomedea melanophrys* —as "out of the Maximilian collection" and as having come from the South Pacific—is undoubtedly a young *Diomedea bulleri*.

Mr. Rothschild has kindly allowed my artist to draw the heads of *Diomedea bulleri* and *D. salvini* (Plate V.) from the actual types in the Tring Museum. It is hoped that this will prevent any further confusion of the species.

* Report on specimen submitted:—Red Dust from the rigging of s.s. 'Doric,' 100 miles off the African coast, in lat. 19° 53′ N. and long. 18° 30′ W. Consists of about 90 per cent. of sea salt, in rough grain $= \frac{1}{50}$ in., which readily develop characteristic crystals. The coloring matter (reddish-brown) is organic; and about 1 per cent. of the organic matter has distinctive form as follows: (1.) Frustules of a marine diatom (*Synedra fulgens*). (2.) Spiculæ of sponges. (3.) Elongated and jointed cells, probably fucoidal. (4). Calcareous spines with a deep groove, probably echinodermid. I think the deposit must be tropical sea-scum that has been picked up by a tornado and distributed in an upper air-current. It is certainly not material swept from a land-surface.—James Hector.

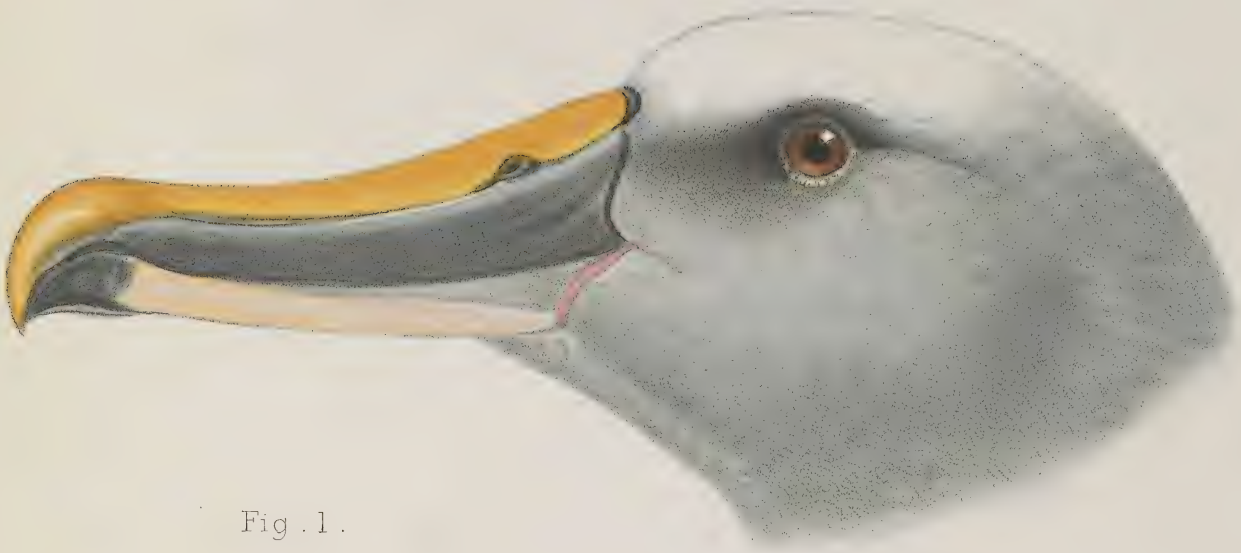


Fig. 1.

Fig. 2.

Fig.1. HEAD OF BULLER'S ALBATROS, (DIOMEDEA BULLERI). 141 p 68.
Fig.2. HEAD OF SALVIN'S ALBATROS, (DIOMEDEA cauta, SALVINI). 144 p 69

(THREE-FOURTHS NATURAL SIZE.)

DIOMEDEA BULLERI.

(BULLER'S ALBATROS.)

Diomedea culminata (*nec* Gould), **Buller, Birds of New Zealand, vol. ii., p. 201.**
Diomedea bulleri, Rothschild, Bull. Brit. Orn. Club, vol. i., p. 58 (1893).

The bird which had hitherto been called *Diomedea culminata* in our New Zealand lists was pronounced by the late Mr. Salvin to be a new species, and is described in the 'Ibis' (vol. v., 1893, p. 572) by Mr. W. Rothschild, who has been good enough to dedicate this new form to myself. The type of the species—besides a very large series of representative specimens—is in the Rothschild Museum at Tring.

The following is his diagnosis: *Thalassogeronti culminato* quoad colores similis, sed rostro pallidiore, culmine ad basin latiore, ad latera attingente, culmine omnino flavo; alis subtus niveis. He adds: "It differs materially from the true *Thalassogeron culminatus* (Gould), a species of Ridgway's genus *Thalassogeron*, the base of the culminicorn being separated by an interval of soft skin from the latericorn. In this respect the present species is somewhat intermediate between *Diomedea* and *Thalassogeron*, but the base of the culminicorn, though not so well developed, distinctly spreads and has a well-defined posterior margin."

The only known breeding place of this species is on the Snares. The nest is quite similar in form and construction to that of *Diomedea salvini*, already described. My informant has supplied me with a number of eggs. They are very elliptical in form, and vary slightly in size, an average one measuring 4 inches in length by 2·5 in. in breadth. Some are uniform creamy-white; others have the larger end more or less splashed with extremely fine dots of reddish brown, becoming confluent in some places and forming an indistinct zone.

According to Mr. Bethune, a very safe authority, this is the only species of Albatros that breeds on the Snares.

Captain Hutton was at one time under the impression that *Diomedea bulleri* could not be separated from *D. culminata*. But in a communication which appears in 'The Ibis,' for April, 1903, he says:—

> Dr. Davidson, of s.s. 'Morning,' has brought to the Museum two specimens of a Mollymawk from the Indian Ocean, which I take to be the true *T. culminatus*. They are certainly distinct from *D. bulleri*, of the Snares, and therefore the latter remains a good species. The difference between *D. bulleri* and *T. culminatus* is in the culminicorn, which is much more expanded posteriorly in *D. bulleri* than in *T. culminatus*. If *D. bulleri* had been put into the genus *Thalassogeron*, and the difference between it and *T. culminatus* pointed out, there would have been no difficulty in the matter. *D. bulleri* is certainly congeneric with *T. salvini*. Neither of these are such typical *Thalassogerons* as *T. culminatus* and *T. chlororhynchus*, but they cannot be separated generically.

Mr. Rothschild writes to me: "As to *Diomedea bulleri*, it seems to me to be intermediate between *D. culminata* and *D. layardi*, and that species was founded (at Mr. Salvin's instigation) on fifteen specimens in my collection."

A beautiful water-colour drawing of this species, on a large scale, by Mr. Keulemans, hangs in my library, and is a constant reminder of those storm-swept rocks at the Antipodes where this Albatros has its breeding station. A successful photograph of this picture, by my friend Mr. J. K. Campbell, is reproduced on page 152. The scene selected is one of the rocky points on the Snares; and in the distance a bird is shown sitting on its peculiar cheese-shaped nest.

DIOMEDEA SALVINI.

(SALVIN'S ALBATROS.)

Diomedea cauta (*nec* Gould), **Buller, Birds of New Zealand, vol. ii., p. 203.**

On the unimpeachable authority of the late Mr. Salvin, Mr. Rothschild has renamed the bird which has hitherto been known to us as *Diomedea cauta*, and has referred it to the genus *Thalassogeron*. The type of Gould's *Diomedea cauta* is in the British Museum, and the present form is distinguished thus: *Similis Th. cauto, sed rostro multo minore, ad basin minus elevato, plumbescente nec albido, tarsis et digitis brevioribus quoque dignoscendus.* Mr. Rothschild adds: "In coloration this species is apparently greyer on the head and neck, the dark loral mark in front of the eye being very conspicuous."

The chief engineer of the 'Hinemoa,' Mr. Bethune (who showed me the stuffed heads of all the species), assured me that *Diomedea salvini*, which is appreciably larger than *D. bulleri*, is found breeding only on the Bounty Islands, to which group it resorts, for reproductive purposes, in countless numbers at the usual season. Both these species are furnished with the peculiar moustachial membranes described below, which they disclose by raising the feathers when irritated or excited. Captain Fairchild, says: "All the Albatroses on Antipodes Island are dark birds (*D. exulans*). *Diomedea regia* is never found there; and, so far as I can learn, *D. regia* is the only species that inhabits Campbell Island."

I have received four eggs of Salvin's Albatros from the Bounty Islands, where Captain Fairchild visited its breeding-place. They differ slightly in size, the largest measuring 4 in. in length by 2·6 in. in breadth, and the smallest 3·75 in. by 2·3 in. They are broadly ovoido-elliptical in shape, and the shell is finely granulated. Two of them are creamy-white, with the larger end thickly splashed with umber-brown, the colouring in one of them being almost as rich as in a Merlin's egg, with a few rounded spots at the smaller end. The other two eggs have only a faint wash of brown at the larger end, with widely-scattered blots (some of them with open centres) all over the surface.

I lately obtained a live bird of this species which was captured at Island Bay. What struck me most was the beautiful appearance of the head—"quite a model," as the intelligent cabman who brought it to me observed. It has a perfectly rotund appearance—most noticeable in a front view—owing to the feathers being puffed out. This character is lost in the dead bird, and necessarily so in the ordinary cabinet skin, but it could easily be represented in the mounted bird. I think this species is without question the most beautiful of the group, as to form and colour, although *Diomedea regia* for size and snowy whiteness takes the palm. In life, the bare membrane down the base of the lower mandible, and the moustachial membrane on the cheeks (usually hidden by the feathers), are of a rich orange-yellow. The black line along the base of both mandibles (outside the yellow membrane on the lower), and from the root of the forehead to the nostrils, is far more conspicuous in the living bird than in dried specimens. The ridge or space between these lines, as well as the whole of the culmen, is of a very delicate lemon-yellow, changing to light horn-colour on the hook. The sides of both mandibles are dull olive-grey, changing to dull pinky-yellow along the rami of the lower mandible, which has its terminal expansion uniform slaty-black. The sides of the mouth, upper and lower, are fringed with a yellow membrane, which, from the junction at the gape, extends obliquely upwards

and outwards for the space of an inch, forming the peculiar feature already described in my account of this species ('Birds of New Zealand,' vol. ii., p. 203). The irides are of a lustrous coal-black, and are wonderfully expressive in their dark facial setting, with a white eyelid underneath. The legs and feet are greenish-grey with flesh-coloured webs, shaded with brown towards the outer edges.

This specimen measured: total length 36 in.; extent of wings 7 ft. 8 in.; wing from flexure 22 in.

On one of my visits to Wanganui I was invited by the late Mr. Drew, then curator of the museum, to examine and identify a live Albatros which had just come in. The bird proved to be an adult specimen (apparently a female) of *Diomedea salvini*. Mr. Drew gave me the particulars of its capture, which would seem to indicate that this bird is nocturnal in its habits. A party of fishermen in their boat, at two o'clock the previous morning—the night being starlight but without any moon—were waiting for the dawn, in order to fish for schnapper. They saw the Albatros hovering about them, and threw out a piece of bait on a line. The bird at once descended to the water, took the hook in its bill, and was towed on board. In this specimen the bill was grey with a yellowish unguis; the black pencilled lines and the yellow cartilage were very conspicuous.

Captain Hutton wrote to me (11th April, 1902): "*T. salvini* is also a bad species. At the very most it might be considered as a variety of *T. cautus*, but there are some individuals of *T. salvini* which are absolutely identical with *T. cautus*. But the membrane on the bill is a bad character." And again: "I think that the only difference, if any, between *T. Thalassogeron cautus* and *D. salvini* is in the colour of the head. I think that the difference in the stoutness of the bill must be sexual; but I should think that Rothschild's fine series ought to settle this point. I shall continue to call the Bounty Island species *D. salvini*, but I think it would be better to consider it as a variety of *T. cautus*. *Phœbetria fuliginosa* is in much the same difficulty. It is the variety *cornicoides* which breeds on the Antipodes and Auckland Islands, and if this variety does not breed at Kerguelen's Island, nor in the South Atlantic, it deserves to be made into a distinct species."

The answer to this is that it was after a careful examination of the "fine series," at Tring that Mr. Salvin, without hesitation, pronounced this species distinct, whereupon Mr. Rothschild characterised it and dedicated it to him by name.

In a later communication Captain Hutton says: "I am convinced that *Thalassogeron* is a bad genus." I think he is right. At any rate, it seems to me there can be no justification for separating *Diomedea bulleri* from the others, as was done by Mr. Salvin, the 'Handlist' following suit. I must either take this out of the genus and place it with *Thalassogeron*, or restore all the members of this group to *Diomedea;* and I have decided on the latter course.

Mr. Rothschild writes to me (June 13th, 1902):—

> As regards *Thalassogeron salvini*, I know that it is close to *T. cautus*, but Professor Hutton makes a mistake when he says that some *T. salvini* are true *T. cautus*, and his mistake is entirely due to working with undated material. Of course, *T. cautus* occurs on the New Zealand coasts, but *not* in the breeding season. It was Mr. Salvin who distinguished them (i.e., *T. salvini* and *Diomedea bulleri*), and advised me to describe them. Not only did Mr. Salvin concur in the descriptions, but he edited and revised them; and as to the membrane between the culminicorn and latericorn, that character is entirely his.
>
> The type of Thalassogeron is *T. chlororhynchus*, which has the wide membrane; but I always held that Salvin had split too much. I believe we have really only two genera, *Diomedea* and *Phœbetria*. I have fourteen species or forms, out of seventeen named forms, and all in series except *D. chionoptera*, and I certainly can distinguish each species easily.

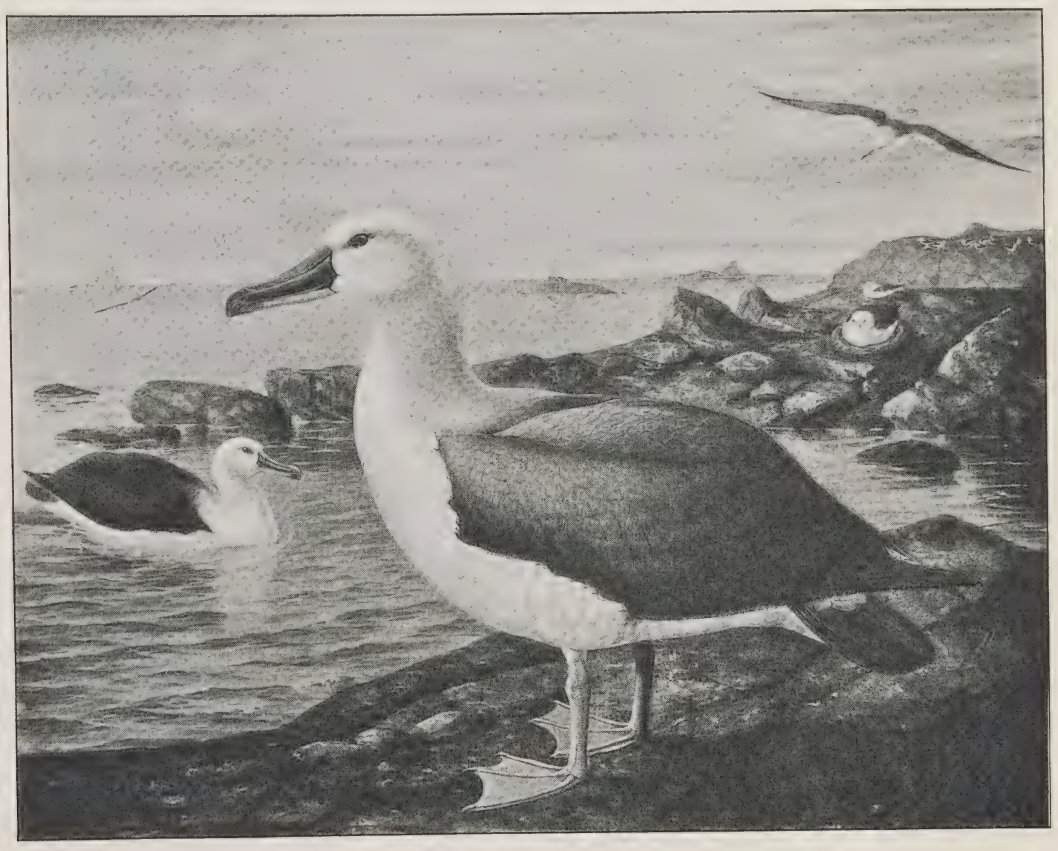
As already mentioned, the breeding haunt of this beautiful species of Albatros is in the

Bounty Islands. There is a nest in the Canterbury Museum, and another in the Otago Museum, and another (perhaps more typical still) in Mr. Jennings' collection. It is in the form of an inverted cone and is composed of grass, seaweed, soil, and the droppings of the bird, pressed close together and forming a compact felt-like mass, which becomes hard and solid by exposure to the sun. The Canterbury specimen presents the appearance of a very thick basin with a heavy rim, about fifteen inches in diameter; and in the hollow there lies a single white egg, of a regular ovoid form.

Nestling.—Has the whole of the body covered with thick grey down; that on the face being shorter and almost white. Bill black.

The adult male in Mr. Jennings' collection has the grey on the neck very conspicuous and a white mark at the back of each eye.

Captain Hutton writes in 'The Ibis,' for January, 1903: "No two species of Albatros or Mollymawk are known to breed in the same locality. Even when two different kinds



DIOMEDEA BULLERI, Rothschild.

are found on the same island—as *D. exulans* and *D. regia* on Adam's Island of the Auckland group—they occupy widely separated sites. So far as I know, *Thalassogeron salvini*, of the Bounty Islands, is the earliest species to breed, for it commences at the end of August. *D. melanophrys*, on Campbell Island, comes next, in the middle of September; then the Sooty Albatros, *Phœbetria fuliginosa*, in the end of October, at the Antipodes and Auckland Islands, and a little later at Kerguelen Island. *D. regia* commences at Campbell Island in the middle of November; *D. chionoptera* at Kerguelen in the middle or end of December; *D. exulans* in the first week of January at Adam's Island, and the middle of January at Antipodes Island; and last comes *D. bulleri* at the Snares-Islands in the end of January. So that there is no less than five months' difference between the first and the last."

DIOMEDEA CAUTA.

(SHY ALBATROS.)

Diomedea cauta, Gould, Proc. Zool. Soc., part viii., p. 177 (1840).

I have in my collection undoubted specimens of *Diomedea cauta*, from the Bounty Islands, and the species must therefore be retained on our list.

Mr. Rothschild writes to me: "There certainly may be a remote possibility of *Thalassogeron salvini* being one sex of what Hutton and the Australian ornithologists call *T. cautus*, for the last pair sent by you to me as *T. salvini* were certainly ♀ *T. salvini* and ♂ *T. cautus* (?). I know that the two types of Gould's *Diomedea cauta* in the British Museum are not the same as the bird which now goes under the name of *D. cauta*, and certainly in Le Souef's glorious photographs of the breeding haunts of these so-called *D. cauta*, the females on their nests have all snow-white heads. But I also know that Salvin was most careful over these, and I shall want a lot of evidence before I can admit that the so-called *T. cautus* is the female of *T. salvini*. The last-named species was founded on nine specimens in my collection."

Writing to me on Feb. 4th, 1901, Captain Hutton says: "I have just returned from a most enjoyable trip round the Southern Island with Lord Ranfurly. He made the most complete collection of these birds that—I suppose—has ever been made, and they are now on their way to the British Museum in the 'Gothic.' What will specially interest you is, that you must retain *Thalassogeron cautus* in our fauna. I got it at the Bounty Islands, where it breeds, and is very common. One specimen of *T. salvini* is said to have come from Antipodes, but Captain Bollons says that there are no Mollymawks there, and I suspect that it may have come from the Bounty Islands."

Captain Hutton writes to me later on: "I do not feel quite sure about *Thalassogeron cautus* at the Bounties. Certainly on these islands there are some birds with stout bills and others with more slender ones, and I think that these are ♂ and ♀. But they have the same colours generally that are typical of *T. salvini*. In a few the head and neck are nearly white—which is characteristic of *T. cautus*. If *T. cautus* and *T. salvini* are distinct, they must be characterised by the colour of the head and neck only; the bill will not do. Not having seen any Tasmanian specimens of *T. cautus*, I cannot make up my mind whether the Bounty Island species is *T. salvini* or *T. cautus*. Probably you can decide this in the British Museum."

I find the following reference to this bird in my diary for 1893:—

March 2nd.—When about 1,060 miles from port (lat. 50° 31′ S., long. 163° 14′ W.) a Shy Albatros (*Diomedea cauta*) put in an appearance, and after performing one or two wide circuits, often rising high in the air, with a very angular disposition of the wings, vanished in the midst of the ocean and was seen no more.

I examined what was said to be the true type of Gould's *Diomedea cauta*, in the Museum at Philadelphia, and I arrived at the same conclusion as Mr. Rothschild.

Mr. Gould states that, when fully adult, the sexes differ but little in colour; but that the female may always be distinguished by her smaller size, and the young by the bill being clouded with dark grey.

DIOMEDEA CULMINATA.

(GREY-HEADED ALBATROS.)

Diomedea culminata, Gould; **Buller, Birds of New Zealand, vol. ii., p. 201.**

There is little doubt that this species, whose true home appears to be the Indian Ocean, occurs at times in the New Zealand seas, as well as its near congener, *Diomedea bulleri*.

Having reference probably to this species, I copy the following entries from my diary for 1894:—

Off the Cape of Good Hope. February 14th.—The wind has freshened, and there is now a rough sea. The Grey Petrel (if the same) has been joined by a mate, and they have remained with us all day. About noon we bore down upon a flock of about fifty Cape Gannets (*Sula capensis*) floating on the water. This species is distinguished by its nearly black tail. During the whole of the afternoon we were attended, at a long distance astern, by a small Albatros which I take to be the true *Diomedea culminata*.

February 15th.—The wind freshened during the night, and to-day we have had a heavy swell setting in from the westward, along the wide expanse of ocean stretching away to Cape Horn. We have been steaming most part of the day only about fifty miles from land, and have seen more birds. In the afternoon we came upon a flock of *Diomedea culminata* (?), about twenty in number, disporting themselves in the water on our weather-bow. They took no notice whatever of the steamer, although we passed quite near to them.

DIOMEDEA CHLORORHYNCHA.

(YELLOW-NOSED ALBATROS.)

Diomedea chlororhyncha, Gmelin; **Buller, Birds of New Zealand, vol. ii., p. 202.**

Captain Hutton says in a letter to myself: "*T. chlororhynchus* and *T. culminatus* are both found occasionally in our seas, but I do not know that they breed here. Dr. Filhol says that *Thalassogeron chlororhynchus* breeds at Campbell Island, but he probably did not distinguish the species accurately. I saw none when I was there in 1901—only *D. melanophrys*, which was extremely abundant, and a few *D. bulleri* or *T. culminatus*."

A specimen of *Diomedea chlororhyncha* (Gmelin) in the Museum at Brussels has a bill fully one-third smaller than in *D. culminata*, Gould, which stands alongside of it. The former has the culmen and edge of lower mandible yellow, as in our *D. bulleri*.

A specimen in Mr. Jennings' collection, shot off the Otago Heads, has the hook of the upper mandible and the terminal shield of the lower very rich yellow. There is a narrow line at the base of the bill, which appears to have been originally pinky. This bare membrane is far less conspicuous, however, in this species than in *Diomedea salvini*.

In *Diomedea chlororhyncha* the head and neck are perfectly white, there being no grey in the plumage of these parts; the superciliary streak and patch in front of the eyes are greyish black.

PHŒBETRIA FULIGINOSA.

(SOOTY ALBATROS.)

Diomedea fuliginosa, Gmelin; **Buller, Birds of New Zealand, vol. ii., p. 205.**

The egg of this species, as described by me (vol. ii., p. 206), is more or less spotted, especially towards the larger pole; but one of the officers on board the 'Hinemoa' has a specimen in his possession which is perfectly white; and I find that Dr. Kidder, in his description of the birds of Kerguelen Island, says of this species: "The egg is single, white, and very long in proportion to its thickness." Of its nesting habits he gives the following interesting particulars: "October 24: Two of the Dusky Albatroses had made a nest upon a shelf formed by a considerable tuft of cabbage and *Azorella* at the entrance of a small cavity in the perpendicular face of a lofty rock, near the top of a hill some two miles away. Here the birds could be both seen and heard. Their scream is very loud, and not unlike one of the calls of a cat. At a distance it has often been mistaken for the hail of a man. The name 'Pee-arr' has been given as descriptive of this call, which is, I believe, peculiar to the breeding-season. Another pair was seen on the same day circling around the same hilltop. No eggs.—November 2: Secured one egg and both birds. The nest is a conical mound, 7 in. or 8 in. high, hollowed into a cup at the top, and lined rudely with grass. The male was sitting when captured; the female standing on another old nest not far away, but higher up the face of the rock. There was no evidence of an intention to rebuild the old nest. Both birds, but particularly the male, showed fight when approached, clattering their large bills with an odd noise, and biting viciously when they got a chance. The male is perceptibly the larger bird of the two. Although I have often observed the Dusky Albatros sailing along very close to the surface of the water, or circling round rocky hilltops, I have never seen it feed, except in captivity. Then both birds ate freely of fresh meat. The peculiar call, which can be heard for a very long distance, is most often given by the sitting bird, and answered by its mate flying near by. . . .—November 12: I found another bird on a nest in a locality similar to that already described. It stared stupidly at me, clattering its beak, and turning its head from side to side, but making no effort to escape. There was no egg. The narrow line of white feathers above and behind the eyes gives these birds a singular and striking appearance—a sort of wide-eyed, amazed air that distinguishes them markedly from other birds. The white feathers are very minute, but quite perfect. This last-mentioned nest was shortly after abandoned by the bird, apparently because it had been disturbed. Another bird was found sitting on an egg on November 22, high in the rocks, and some four miles inland."

There is a specimen in the Canterbury Museum—taken somewhere in the South Atlantic—in which the whole of the plumage is of an uniform dark slate colour.

This species is more wary in its breeding habits than any other species of Albatros. It breeds both in the Auckland and Campbell Islands. But it usually selects, as a nesting-place, a ledge of rock high up on the face of the cliff, and quite inaccessible, either from above or below. A nestling in down in my collection was brought by the 'Hinemoa' from the Auckland Islands, but the eggs of this species have not yet been obtained there, although strenuous efforts have been made from time to time by the officers of the 'Hinemoa' to reach the nests. Apart, therefore, from its modifications of structure, the entire difference in its habits of nidification would quite seem to justify the placing of this Albatros in a genus by itself.

The late Captain Fairchild, ever on the alert for new or interesting forms, brought me a pair of these birds which he had shot from an open boat a few miles north of Cape Palliser. He stated that, during the many years he had been navigating on this coast, he had never before met with this Albatros so far north as that. The broad white mark which encircles the eyes, except in front, is particularly conspicuous in the male bird; and the white shafts in the feathers of the tail, which is rather long and acuminate, are a very pronounced feature. Bill ivory-black, with a pale-blue line near the cutting-edge of the lower mandible, running off to a point in front of the terminal expansion; feet pinkish fleshy-white, clouded with grey at the joints, on the interdigital webs, and along the outer edge of the foot; claws white-horn colour; irides rich dark-brown. Length, 36 in.; extent of wings, 82·5 in. He informed me that about the end of May or beginning of June, when off Milford Sound, in the 'Hinemoa,' he saw fully a dozen Sooty Albatroses coursing about together—a most unusual circumstance.

I have in my collection a younger nestling of this Albatros than the one described in the 'Birds of New Zealand.' The whole body is covered with thick woolly down of a slaty-grey colour, except on the forehead, face, and throat, where the down is very short and thick set, having the appearance of pile-velvet. This stumpy growth is black; but a patch of white encircles the eyes, fills the lores, and sweeps over the base of the bill, having the appearance of blinkers. Bill and feet black.

I have another down-covered nestling of this species, received from the Auckland Islands. The carpenter on board the 'Hinemoa,' who is a very intelligent man and has collected many good specimens at the Islands, informs me that this species of Albatros—unlike the others, which place their nests on the ground within easy reach—selects for nesting purposes the ledges of rocks on the face of the cliffs, and often in the most inaccessible places.

This species breeds on Campbell Island, Auckland Islands, and Antipodes Island (*Hutton*).

Young. Covered with very long and thick down of a pale sooty colour; on the forepart and sides of head feather-like and several shades darker in tint. A band of feather-like down encircles the eyes, and extends forward to the base of the bill, having very much the appearance of a pair of spectacles. Bill black; legs brownish grey, claws lighter.

Obs. In the adult bird the white ring extends right round the eyes. There are some good specimens of both adult and young from the Auckland Islands in Mr. Jennings' collection at Dunedin.

Mr. Salvin ('Cat. B. Brit. Mus.,' xxv., p. 454), writes:—

> Individuals with a much greyer abdomen and back are not uncommon, mingled with the ordinary form. Captain Hutton has named them *Diomedea fuliginosa* var. *cornicoides*. If these birds can be traced to a definite breeding place where they alone are found, it would be well to assign them specific rank.

The following is an entry in my diary for 1894, already cited:—

23rd February.—We are attended to-day by a large number of sea-birds, including several species of Albatros, *Diomedea fuliginosa*, however, preponderating. The flight of this species is very easy and buoyant and it rises more gracefully out of the water than any of the other species of Albatros. When on the wing the somewhat long, wedge-shaped, tail is very conspicuous. It is a powerful flyer, and Captain Kempson says that he has known a marked bird follow the ship for three thousand miles at a stretch. The number of these Sooty Albatroses continued to increase till, in the afternoon, I counted five-and-twenty in close attendance on the ship. There was a single grey-and-white Petrel which I referred to *Priofinus cinereus*, although we do not appear to have yet reached the ordinary range of that gregarious species. *Fregetta melanogaster* was particularly numerous, hunting as it were in a community, often rising high in the air and performing a rapid bat-like flight, very unlike that of the other Storm Petrels. The *Prions* that were so plentiful yesterday

have entirely disappeared. This sudden absence, although the conditions of weather and sea remain the same, seems to prove the theory which I have previously advanced, that flocks of different species feed over certain tracts of the ocean, the particular areas being no doubt in great measure determined by the food-supply.

2nd March.—Lat. 48° 35′ S., long. 111° 26′ E. A white-marked Sooty Albatros is with us still. We first saw it on the 29th, and we have ever since been steaming at the rate of fourteen knots an hour. At 5 p.m. the rare *Thalassœca antarctica* paid us a visit, and made three circuits at a moderate distance from the ship. It is a beautiful object on the wing, and has a very graceful flight. Saw what appeared on the wing to be a pair of *Puffinus bulleri*.* They carry their long pointed wings in a bow shape, and make rapid sweeps in the air, crossing always in front of the ship.

HYDROCHELIDON LEUCOPTERA.

(WHITE-WINGED BLACK TERN.)

Hydrochelidon leucoptera (Schinz.), **Buller, Birds of New Zealand, vol. ii., p. 77.**

Mr. Howard Saunders states (P.Z.S., 1876, p. 642) that this species has been obtained in Australia and New Zealand, but he does not give any localities. With the exception of the single example mentioned in the 'Birds of New Zealand' (vol. ii. p. 77), I have never heard of this bird being seen on our coasts.

HEROPROGNE CASPIA.

(CASPIAN TERN.)

Sterna caspia (Pallas), **Buller, Birds of New Zealand, vol. ii., p. 73.**

I have nothing to add to the full history I have given of this species.

I met with it on the Island of Wakaya, in the Fiji group, and again at the entrance to Suva harbour.

* *Puffinus bulleri*, Salvin. The proper range of this species has not yet been ascertained or defined. The type, now in the Rothschild collection, was picked up by me on the Waikanae coast many years ago. Another specimen (the type of *Puffinus zealandicus*, Sandager), now in my possession, was taken at Mokohinu Island, in the Hauraki Gulf, having dashed itself against the lighthouse at night; and the only other known specimen, now in the British Museum, was obtained from a dealer, labelled "from New Zealand seas." These may therefore be only stragglers out of the ordinary range of the species.

STERNA ALBISTRIATA.

(BLACK-FRONTED TERN.)

Sterna antarctica, Wagler; **Buller, Birds of New Zealand, vol. ii., p. 70.**
Sterna albistriata, Gray, Voy. Ereb. & Terr., Birds, p. 19, pl. 21 (1844).

This is one of the most useful of birds to the agriculturist, for it comes in from the sea and preys on the numerous little enemies of the farmer. Indeed, it is a very pretty sight to watch a flock of these swallow-like birds following the plough and gleaning worms, grubs, beetles, and even lizards, from the surface of the newly-turned soil. They are tireless on the wing, and nothing escapes their vigilant eyes.

STERNA VITTATA.

(SOUTHERN TERN.)

Sterna vittata (Gmelin), **Buller, Trans. N. Z. Inst., vol. xxviii., p. 348.**

At the meeting of the British Ornithologists' Club, held on May 31st, 1895, Mr. Rothschild reported that he had received from Mr. Henry Travers a pair of *Sterna vittata*, Gmelin, shot in the month of February of that year, at the Bounty Islands, by the crew of the 'Hinemoa.' The species had been identified by Mr. Howard Saunders and Dr. Hartert, after comparison with the specimens in the British Museum. I afterwards examined a specimen of this "rare Antarctic bird" in the possession of Mr. Bethune, the Chief Engineer, from the same locality. He assured me that he had met with it also at Campbell Island and at the Snares; also that its habit was to fly in pairs (like *Sterna nereis*), and not in flocks.

Captain Hutton writes that *Sterna vittata* is "common at Campbell Island, Antipodes, and Bounty Islands."

There were four specimens in the collection made by the 'Challenger' Expedition from Betsy Cove and Christmas Harbour in Kerguelen's Land.

STERNA FRONTALIS.

(WHITE-FRONTED TERN.)

Sterna frontalis, Gray; **Buller, Birds of New Zealand, vol. ii., p. 68.**

On the Taupo plains, where there are thousands of sterile acres covered with manuka scrub, about five or six miles inland of the lake, I observed two Terns, apparently of this species, hovering over the ground, although I found it difficult to imagine what they could find to attract

them in such a barren locality. Probably they were in quest of lizards. This species frequents the Taupo Lake, and so does *Sterna albistriata*.

I found this Tern abundant at Tonga. I saw no *Sterna caspia* there, but they are plentiful at Wakaya, in the Fiji group.

STERNA BETHUNEI.

(BETHUNE'S TERN.)

Sterna bethunei, Buller, Trans. N.Z. Institute, vol. xxviii., p. 349.

A larger form was discovered by Mr. Bethune, of the 'Hinemoa,' at the Auckland Islands, specimens of which I exhibited to the Wellington Philosophical Society, in 1895, and which I then named provisionally *Sterna bethunei*.

It is similar in plumage to *Sterna frontalis*, but is appreciably larger, with a longer and more robust bill. Like the last-named species, it is gregarious, hunting in flocks, whereas *Sterna vittata* flies in pairs. The specimen examined by me gave the following measurements:—Extreme length, 17·75 in.; extent of wings, 28·5 in.; wing from flexure, 11 in.; tail, 7 in.; bill, along the ridge 2 in., along the edge of lower mandible 2·5 in.; tarsus, 1 in.; middle toe and claw, 1·25 in.

I should have been glad to receive further specimens before characterising it as a new species; but, as I consider it distinct, it may be thus diagnosed:

Ad. ptil. æstiv. similis *S. frontali* sed paullo major: rostro et pedibus valde majoribus.

STERNA FULIGINOSA.

(SOOTY TERN.)

Sterna fuliginosa (Gmelin), **Buller, Trans. N. Z. Inst., vol. xxvii., p. 117.**

I have received a fine series of specimens from the Kermadec Islands. I can distinguish no difference in the plumage of the sexes; although, as a rule, the male is a finer and somewhat larger bird than the female.

I find the following note in my diary:—

When we were about eighty miles from the Phœnix group, towards evening, a flock of Terns appeared, to the number of eight or more, and kept about the ship for some time. They did not approach very near, but, so far as I could make out, they belonged to the above species (called by the sailors 'Wideawake Gulls'). Their flight was rapid and fitful, and they kept up incessantly the peculiar Tern-cry of 'kek-kek-kek.' I was informed by the Captain that they appeared again on the following morning when we were considerably more than a hundred miles from land. It would seem that this Tern is more pelagic in its habits than the other species. Mr. Cheeseman reports that the species breeds in countless numbers at the Kermadecs, but disappears entirely in the winter. The Phœnix group of islands is about half-way between Fiji and Honolulu in the direct line of the Canadian-Australian course. We passed through them during the night, but we saw nothing of the Terns till towards evening of the following day.

Mr. North, in his published account of the birds on Lord Howe Island, has the following interesting remarks on this species:—

This bird was found breeding on the rocky ledges and flat parts of the cliffs, but more often on the bare sand; little or no attempt was made at forming a nest, except in a few instances where a little *débris* was found scraped around the single egg laid by this bird for sitting. Mr. Saunders, who visited the island during the breeding season, collected a large number of the eggs during November. In a series of over one hundred eggs examined, there is a great variation in the size, colour, and disposition of their markings. The predominant form is oval, tapering slightly towards the small end, the colour a dull white, some being nearly devoid of markings, others uniformly freckled and spotted over the whole surface of the shell with reddish-brown markings, others have large irregularly-shaped confluent blotches of purplish-red and slaty-grey, the latter appearing as if beneath the shell, these markings predominating—in some towards the larger end of the eggs—and a number have rounded spots of rich-red evenly distributed over the surface of the shell. In comparatively few instances do the markings assume the form of a zone. Measurements: 2·13 in. by 1·42 in.

Mr. Etheridge also, writing of the same locality, says:—

The white breast, white forehead and cheeks, and otherwise black plumage of this graceful species, with the two long delicate tail-feathers, render it very conspicuous. In Gould's figure of *Sterna fuliginosa* the two characteristic tail-feathers are represented as black with a white edging, whereas, in reality, they are quite white with the slightest possible cloud on the inner margin. The egg is laid on the exposed surface, ledge or rock, or on bare spots amongst grass, without protection of any kind, from immediately above high-water mark upwards to the full height of the island. The eggs, which vary much in the mottling of the surface, are plentiful at the beginning of September.

Mr. Jennings, of the Otago Museum, showed me two eggs of this Tern, in his private collection, received from the Kermadecs. They are broadly ovoid in shape, and white, marked over the entire surface with spots and small splashes of rich umber-brown. At the larger end of one of them, some of the markings are confluent; the other is similarly marked, but the spots are more minute and there is no confluence. These eggs are similar in size to those of *Sterna frontalis*, to which they bear a general resemblance.

Mr. Cheeseman, in his account of the birds of the Kermadec Islands, officially visited by him in 1887, gives the following particulars respecting this Tern:—

This species arrives at the end of August and remains until the end of December or middle of January. According to Mr. Bell, it is one of the commonest sea-birds on the islands during this period, although very rarely seen during the winter months. It is active and noisy, and its first act on arriving on the island is to drive off the few hawks which are present. It is gregarious, breeding in immense colonies both on the main island and the adjoining rocks, one of the largest breeding-places being on the sandy beach of Denham Bay. Its nest is a slight bottom scooped out of the bare sand, and it only lays a single egg. The eggs seem to vary in size, but the average of size in those sent by Mr. Bell is 2·1 in. by 1·5 in. The colour is a pale buffy-white, copiously marked with blotches of reddish-brown.

In the British Museum collection there are specimens from North America, Panama, Jamaica, and the mouth of the Amazons; from Ascension Island, Fernando Po, Madagascar, Mauritius, Seychelles, Ceylon, Duke of York Island, Australia, the Fiji Islands, Phœnix Island, and the Sandwich Islands. It will be seen, therefore, that the species has an extensive range.

STERNA NEREIS.

(LITTLE WHITE TERN.)

Sterna nereis (Gould), **Buller, Birds of New Zealand, vol. ii., p. 75.**

This little Tern is so rare with us, and so common on the Australian coast, that I am inclined to accept Mr. Henry Travers' suggestion, that those we meet with are mere stragglers from the neighbouring continent.

It is not often that this species leaves the sea-coast; but on one occasion I observed a pair of them fishing in fresh water on the Papaitonga Lake, several miles from the sea. They were dipping into the water, with a tiny splash, at rapid intervals; and, as there can be no white-bait at this season (December), I much fear that they were regaling themselves on the fry of Loch Leven trout, of which I had placed six thousand in the lake.

In January, I saw a pair at the Wairoa Heads. They were fishing in roughish water, and very near the surface. This bird does not appear to be gregarious, like the other members of the genus. I have never seen more than a pair together.

Mr. Hamilton states that on the Hawke's Bay coast this Tern is only seen during or after heavy weather.

A nestling, said to belong to this species, received from the Chatham Islands, is covered with soft fulvous-coloured down, fading to creamy-white on the under parts, and thickly marked and speckled on the upper surface with brownish-black; bill dull yellow with black tips; feet dull yellow.

I reprint the following from Dr. Ramsay's notes: "Eggs slightly pyriform, length (A) 1·39 in. to (B) 1·43 in.; breadth (A and B) 1·02 in. The colour is of a light yellowish-brown stone colour or creamy-buff; one (A) thickly sprinkled all over with black dots and irregular shaped spots, the other (B) has large black patches on the thicker end. These eggs were sent as those of the 'Minute Tern,' from Tasmania, where the bird is common."

PROCELSTERNA CINEREA.

(THE LITTLE NODDY.)

Anous cinereus, Gould; **Buller, Birds of New Zealand, vol. ii., p. 78.**

I have received several specimens from the Kermadec Islands, where it is somewhat common. I have never heard of its occurrence on the New Zealand coast.

Mr. North, writing of this bird in Australia, says: "This species was found breeding in the early part of September, also during the month of November. The eggs were rather difficult to obtain. For the purposes of breeding, this bird usually resorts to almost inaccessible ledges of

rocks, but sometimes deposits a single egg on the bare sand. In form the eggs are nearly true ovals, being but slightly tapered at one end, of a dull creamy white ground colour, being sparingly freckled and spotted with faint reddish-brown and slaty-grey markings, the latter colour predominating in some instances, and appearing as if beneath the surface of the shell; others have short, thick, wavy markings, resembling ill-shapen letters and figures, equally distributed over the surface of the shell, which, although not thickly disposed, yet are in some places confluent and more indistinct."

An egg of this species of Noddy, received from the Kermadecs, is of a regular ovoido-conical form, and creamy-white, with some widely scattered dots of pale brown, many of these being quite obscure as if under the surface. It measures 1·65 in. by 1·2. in.

Mr. Cheeseman, in his paper on the birds of the Kermadec Islands, writes :—

> This was one of the commonest sea-birds at the time of my visit in 1887, and was especially plentiful on the outlying rocks. During our stay we landed two or three times on Meyer Island, and on each occasion almost every ledge on the cliffs near the landing place was occupied by these birds, which watched our proceedings with the greatest curiosity. Small flocks of them would every now and then leave their resting-places, fly backwards and forwards over our heads, noisily screaming all the time, and then return to their quarters, to be quickly imitated by another party. They were quite tame, allowing us to approach within a few feet. On discharging a gun clouds of them rose in the air, circling or wheeling about in the utmost confusion, but they soon quieted down. . . . According to Mr. Bell, they breed in October and November, selecting ledges on the faces of the cliffs. No nest whatever is made, the single egg being deposited in a slight natural hollow. One sent to me measures 1·7 in. by 1·1 in. In colour it resembles that of *Micranous leucocapillus*, but is slightly darker, and the spots are much smaller and more numerous.

ANOUS STOLIDUS.

(COMMON NODDY.)

Anous stolidus, Linn.; **Cheeseman, Trans. N. Z. Inst., xxiii., p. 222.**

Mr. Cheeseman includes this species among those breeding on the Kermadec Islands. This might have been expected, as this Noddy has a wide range, and large breeding stations exist on Norfolk Island and in the Tonga group.

I do not possess any New-Zealand killed specimens, but there is an example in the Canterbury Museum which was taken on the high seas, not very far from our coasts.

The following entry is from my diary for 1893 :

> March 24th.—To-day, when about a hundred and forty miles from Rio, in lat. 29° 25′ S., and long. 45° 53′ W., a Noddy (*Anous stolidus*) came up to us, and, after hovering about for some time with a beautiful hawk-like flight, alighted on the ship. From the absence of white on the crown, it was evidently a young bird, and it was so tame and fearless that I actually touched it with my hand before it took flight again.

MICRANOUS LEUCOCAPILLUS.

(BLACK NODDY.)

Sterna leucocapilla, Gould, P. Z. S., 1845, p. 103.

I have received a large number of specimens of both sexes (which are exactly alike) from the Kermadec Islands.

The egg of this species is ovoid and white, with a zone of rich brown spots at the larger end, the rest of the surface exhibiting very obscure or washed-out spots.

Mr. Cheeseman writes :—

I have received two skins and several eggs of this handsome species from Mr. Bell. He states that it is tolerably common on the Kermadec Islands during the spring and summer months, but disappears at the commencement of autumn. So far as he knows, it only breeds on Meyer Island. It makes a slightly hollowed nest of seaweed mixed with leaves, which it connects to the branches of trees a short distance from the ground. Usually it selects a closely branched *Pisonia* for this purpose, but the ngaio and pohutukawa are also made use of. Only one egg is laid. Those sent to me measure 1·80 in. by 1·25. The ground-colour is creamy-white, and on it are numerous rather small spots of reddish-brown.

GYGIS ALBA.

(WHITE TERN.)

Gygis alba (Sparrm.), **Buller, Trans. N. Z. Inst., vol. xxv., p. 73.**

I received several beautiful specimens of this snow-white bird from the Kermadec Islands, from which locality Mr. Cheeseman had already added it to our list of species.

Mr. Gould informs us that this lovely Tern ranges over the whole of the South-eastern coast of Australia, from Moreton Bay to Cape York, and is also found on Norfolk Island, where it is said to breed.

Mr. Bell, of the Kermadec Islands, states that this species lays its single egg high up on the pohutukawa trees growing on the coast, sometimes on a horizontal branch not much thicker than a man's wrist. The bird looks so closely after the egg as to keep it in position till it is hatched. Although its habit here is to nest on trees, Dr. Graff, the German collector, found it nesting in natural hollows of the bare rock on one of the islands of the Phœnix group.

LARUS BULLERI.

(BULLER'S GULL.)

Larus bulleri, Hutton; **Buller, Birds of New Zealand, vol. ii., p. 58.**

I look upon this Gull as one of our rarest species, because it is met with only in certain widely separated localities. The late Mr. W. T. L. Travers obtained specimens many years ago in Lake Guyon, in the provincial district of Nelson, and nearly all the examples in my collection came from inland waters near Timaru. There is hardly a specimen in any of the Colonial museums, and, so far as I am aware, the Tring Museum is the only one in England possessing anything like a series of them.

It is said to be numerous in the estuary of Westport, but I am not sure that the species has been correctly identified. There is a Gull with a brown bill (distinct from *Larus scopulinus*), with which it may have been confounded; for I have received a Gull from Otago—coming nearer to *Larus bulleri* (Hutton) than any of the others—which appears to be a distinct species. It has the same narrow bill as *Larus bulleri*, but instead of being entirely black, as in ordinary specimens, the mandibles are reddish-brown at the base, with black tips, which may be due to the season of the year in which the bird was killed. The legs, however, which are blackish-brown in *Larus bulleri* all the year round, appear, as far as one can judge from the dried specimen, to have been pale or pinky-red. It seems to be an adult bird, notwithstanding the sub-terminal patches of black on the outer webs of the secondaries, and I therefore examined with interest the markings on the primaries, which are now recognised as being the safest criterion for separating these closely-allied forms. These I found to be very different from those in the other species of the group. The first primary has a long oar-shaped mark of white extending almost its entire length, and spreading out again at the base; the second primary has a smaller and more spatulate mark of white; the third primary has an irregular longitudinal bar of white occupying both sides of the shaft and extending to within 2 inches of the tip; in the succeeding quills the same character is continued, but the white mark assumes a more symmetrical and rounded appearance.

Mr. Alan Jackson's collection of eggs, in Dunedin, contains an egg of *Larus bulleri*. It is ovoido-elliptical; greenish-grey, covered more or less with blackish-brown markings, more thickly at the larger end, where they assume fantastic shapes, presenting a fanciful resemblance to certain well-known Arabic characters—a very beautiful cabinet specimen.

The egg is usually broadly oval; generally greyish white, widely frecked with purplish brown, the markings at the larger end assuming the form of a zone.

Mr. Townson informs me that *Larus bulleri* is comparatively abundant in the estuary of the Buller. My last six specimens of this beautiful Gull were obtained in a backwater about 100 miles from the coast, in the South Island, where they have a breeding ground. For obvious reasons, I do not care to disclose the exact locality.

Mr. Howard Saunders says of this Gull, in the 'Catalogue of Birds' (vol. xxv., p. 234): "This species appears to be largely insectivorous. Its wing-pattern and the tail-feathers are peculiar, and it seems to have no very close allies."

The late Mr. T. H. Potts, a great lover of birds and a good observer, gave, in the 'Zoologist' for 1885, the following interesting account of a breeding-place of this species on the narrow pebbly shore of Lake Camp, which lies under the Harper Range, in the Upper Ashburton district:

"Just above the water, on the bare shore, without any attempt at nest-building, the Lake Gull lays one or two eggs, in close proximity to hundreds more; we can scarcely walk through this nursery without causing damage by breakage or by treading on some newly-hatched dark-eyed youngster, clad in grey. The eggs are remarkably beautiful, far handsomer and bolder in their markings than those of any other species of New Zealand Gull. In shape they differ much, for some are very broad at the top, with the smaller end quite obtusely rounded; others ovoid, oval, or so narrowed towards the smaller end that they might be termed almost pyriform. In the 'Birds of New Zealand' the author gives a good description of the eggs of this bird, from my collection in the Canterbury Museum. These eggs came from a nursery on the Upper Rangitata River. I see from my note-book they were obtained on December 14th. Looking at a series of the eggs, the ground colour usually is pale olive-brown or greenish-grey, with very rich splashes and large blotches of marks and dark browns."

LARUS NOVÆ-HOLLANDIÆ.

(AUSTRALIAN GULL.)

Larus novæ-hollandiæ, Stephens, Cont. of Shaw's Gen. Zool., vol. xiii., p. 196.

There can be no question as to the right of this species to a place on our list, for I have in my collection a specimen, shot on the New Zealand coast, which accords exactly with the description given by Mr. Howard Saunders. The bill, which is appreciably larger than in *L. scopulinus*, is of the same arterial-red colour.

It is said to inhabit all the coasts of Australia, except on the western side; also Tasmania, New Caledonia, and probably the Fiji group. Mr. Gould, who called it *Bruchigavia jamesoni*, stated that he also found it frequenting rivers and inland lakes of any considerable extent, and sometimes breeding on the marshes in colonies of many hundreds. He refers to its light and buoyant flight, and adds: "It runs over the surface of the ground with lightness and great facility, and is altogether one of the most beautiful and fairy-like birds I have ever met with."

There are specimens in the Liverpool Museum from Norfolk Island.

Bonaparte dedicated the Torres-Strait Gull to Mr. Gould; but it is not separable, as a species, from *L. novæ-hollandiæ*.

LARUS SCOPULINUS.

(RED-BILLED GULL.)

Larus scopulinus, Forster; **Buller, Birds of New Zealand, vol. ii., p. 55.**

In New Zealand we have an excellent proof of the wisdom of protective legislation in the numbers and increasing tameness of the Sea-gulls that now frequent our harbours and estuaries. Not only are these birds very ornamental as they rest on the wharves and jetties, or hover lightly among the shipping at its anchorage, but they do good service to mankind as scavengers of the sea by devouring the garbage which will inevitably find its way into the water in the vicinity of human habitations, and which, unless consumed, decomposes and vitiates the atmosphere. On my last visit to Auckland I was much interested at seeing scores of Sea-gulls of both species (*Larus dominicanus* and *L. scopulinus*) crowded together on the ridge-boards of the sheds on the Queen-street Wharf, in the very midst of the busy traffic. After years of rigid protection the birds have become quite familiar with the presence of man, and are, indeed, practically domesticated. What will happen in the course of time I saw exemplified at Glasgow, where hundreds of Kittiwake Gulls are to be seen all day long disporting themselves in the turbid waters of the River Kelvin, as it flows through the grounds in front of the Hunterian Museum. They are just as fearless and confident as domestic fowls, being wholly indifferent to the stream of passengers to and fro on both sides of the river. I met with another instance of this at Blairquhan, the country seat of Sir Edward Hunter-Blair, Bart. Here, owing to the close protection given to a small lake in the park, a couple of hundred Wild-duck had become perfectly tame, and would come up every day to the keeper's house to be fed. These same birds on being seen on the River Girvan close by, where shooting is allowed, are as shy as ever. So much for the intelligence of the common Wild-duck, which has learned to regard the park lake as a sanctuary, where it is perfectly safe from molestation! But to return to the Sea-gulls. The manner in which they have increased in Wellington Harbour during the last few years, in spite of advancing traffic, is a striking proof of the efficacy of this protection. At Pitone, where the Gear Meat-freezing Works are situated, there is of necessity a considerable discharge of refuse matter, and the number of Sea-gulls, of both species, that congregate there on the beaches and gravel-banks is something surprising.

On my last visit to Tokanu, on Lake Taupo, I noticed many hundreds of birds flying overhead, and the natives assured me these were the Tarapunga (*Larus scopulinus*) on their regular migration from the Rotoaira Lake. This was on the 25th October. The birds were at a considerable elevation, presenting peculiar combinations; at one time flying in closely-packed lines, then forming into a wedge-shape, and then scattering again like a flock of crows, and uttering all the time loud cries of *kek—kek—kek*. Large contingents of the birds had already arrived, and were to be seen crowding together in large numbers on the exposed sand-banks, just above the surface of the water.

Around the head of the Thames Gulf there are tens of thousands of acres of low-lying flats that are covered with water only at the highest spring tides. A short kind of sandfire grows plentifully over the ground, which is infested with the small black crickets, the surface being honey-combed with their burrows. They are here in millions. On the slightest alarm they scuttle off to find shelter, and it is amusing to see half a dozen of them at a time trying to squeeze into a hole

only large enough to admit one. But such is a cricket's life on these flats! In dry weather, when the tides are low, this is a perfect harvest-ground for the Tarapunga, whole acres being sometimes covered with these small Gulls, devouring crickets as fast as they can pick them up.

At Stewart Island, at the end of February, 1896, I saw in Half-Moon Bay, a considerable flock of these lovely Gulls, many of which, as I could distinctly see, had red bills and feet, whilst others had pale feet. To solve the matter I shot one of the latter which proved, on dissection to be a female. The plumage was the same as in ordinary specimens of *L. scopulinus* and the bird was a fully adult one. The bill in its basal half was reddish-brown, the rest being pale brown, whilst the legs and feet were greyish-brown instead of being red; irides pale grey, with jet-black eye-lids. These differences, not being seasonal, are evidently characteristic of the female.

It is a very pretty sight to watch several hundred of these little Gulls fishing in company. Subjoined is a snap-shot, taken with a hand camera, by Mr. Herbert Steadman, of Whangarei, at a flock of these birds following a shoal of kahawai fish in the Hauraki Gulf.

LARUS SCOPULINUS FOLLOWING SHOAL OF KAHAWAI.

Young.—On board the little steamer 'Awarua,' I noticed two young ones in a cage. The upper surface was very prettily variegated, the centre of each feather being pale brown, with a narrow white margin. This is the first year's plumage.

The nest is usually a very unfinished structure of grass and sea-weed loosely thrown together, and pressed down in the centre.

Mr. Saunders records specimens from Chatham and the Auckland Islands, remarking that examples from the last-named locality have unusually short, stout bills.

LARUS DOMINICANUS.

(SOUTHERN BLACK-BACKED GULL.)

Larus dominicanus, Licht.; **Buller, Birds of New Zealand, vol. ii., p. 47.**

This Sea-gull, under the protective legislation, has become very numerous of late years in Lyttelton Harbour; and it is a pretty sight to see them hovering about among the shipping. It is remarkable that the young birds in grey plumage do not, as a rule, accompany the old ones in their flights inland to forage on the fields.

As a contribution to the history of this well-known species, the following note, furnished by the late Mr. Drew to the *Wanganui Chronicle*, is worth preserving: "It is not at all uncommon to see both kinds of our Sea-gulls as pets on lawns and gardens, but I think it very uncommon to find them nesting and producing eggs in captivity. This singularly rare ornithological occurrence has come under my notice lately. Mrs. Martin, of Wilson Street, has one of these pets; it is the large Black-backed Gull (*Larus dominicanus*) or the Karoro of the Maoris. The bird is quite tame —comes when called, &c.—but during the whole nineteen years of its captivity has never started egg-laying; in fact, was always thought to be a male bird. But this year, to the surprise of her mistress, she has constructed a nicely-built nest, and in it has laid three beautiful spotted eggs. 'Maori'—for so she is called—is fruitlessly sitting on her unfertile eggs—or, I should say, on two of her own and one hen's egg, for the third egg has been taken from her and is now in the Museum. I wonder if she has noticed the difference!"

At New Waddington station, in the Canterbury district, about forty miles from the coast, I saw in the month of March over a hundred of these Gulls in a field which had been turned over by the plough. They were busy foraging in the loose ground for worms and grubs; and what struck me as curious was that there was not a single bird in the grey garb of immaturity present there. They were all adult birds in black and white plumage. The young birds have either not the courage to leave the sea or the strength of wing necessary for such an excursion.

There is a wonderfully massive nest of this species in the Canterbury Museum, measuring over two feet in length by eighteen inches in width, with a thickness of nearly a foot. It is composed of sea-weed and other drift vegetation pressed together and forming a substantial structure—so built probably in order to be out of the reach of the surf.

On leaving Auckland Harbour (in October) I saw something which I had not observed for years: in a flock of Sea-gulls following our steamer there were two birds with a dark breast, the line of demarcation being quite even—and more pronounced in one than in the other—almost as distinct in fact as on a Wood-pigeon's breast. Both had black tails and exhibited changing plumage on the back, showing that they were merely transitional states of *Larus dominicanus*.

The protection of the Sea-gull is undoubtedly having a very good effect, and a wise protection it is, for there is not a more useful bird as a scavenger of our harbours. They have recognised this fact in San Francisco, where, I understand, the penalty by law for killing a Sea-gull is *three months' imprisonment*, without the option of a fine.

In the Liverpool Museum there are seventeen specimens from New Zealand, Chili, Kerguelen's Land, and South Africa; and the British Museum also contains an excellent series.

MEGALESTRIS ANTARCTICA.

(SOUTHERN SKUA.)

Stercorarius antarcticus (Less.), **Buller, Birds of New Zealand, vol. ii., p. 63.**

On June 18th, when about 100 miles off the Australian coast, the weather being fine, a single Gannet passed us, and two hours later, a whole flock of them. After nightfall, the steamer being at rest waiting for the 'Perthshire,' which we had in tow, to refit her apparatus, a Southern Skua came up to the ship with its peculiar soft winnowy flight, passed once or twice round us, as if taking stock of us, the bird being very distinctly visible in the starlight, and then settled down daintily in the water to pick up some offal we had thrown overboard. This bird is, therefore, somewhat nocturnal in its habits.

I kept a tame one in my garden at Wellington for a considerable time, and he was very intolerant of his domain. He bullied a Sea-gull (*Larus dominicanus*) confined with him most unmercifully, chasing him off the ground at every opportunity and fairly danced with excitement on these occasions, lifting his wings and springing up from the ground. I once introduced a Red-billed Gull, (*Larus scopulinus*) which at once made for the garden fountain and seemed quite at home. Half an hour later I returned and found that the Skua had resented the intrusion by killing the bird outright. On leaving Wellington, I presented this autocrat of the garden to Mr. Walter Rothschild, and shipped it to England. It arrived in safety, and no doubt did its best to dominate Tring Park, but I did not learn much of its subsequent history, although I saw the bird there, in perfect health, two years later.

I have, as already recorded, been much struck with the readiness with which this bird adapts itself to a strictly terrestrial existence. Writing of the species, however, on Kerguelen Island, Dr. Kidder says:

> As a general rule its habits are terrestrial; and on the few occasions when, probably after poor success in hunting, I have seen it alight in the water, it has held its wings up perpendicularly, like a butterfly, as if afraid of wetting them. . . There being no land-birds on Kerguelen Island besides *Chionis*, the office and most of the habits of a Buzzard-hawk have been assumed by this great Skua. It was at first taken for a Hawk by all of us, its manner of flight, watchfulness of the ground over which it flew, and habit of perching on spots commanding a wide view, all suggesting this impression. It was, indeed, difficult to believe the evidence of my own senses when I found a web-footed bird avoiding the water, and preying solely, so far as my observation extended, upon other birds.

I find the following entry relating to this bird in my diary for 1893:

> *Off the New Zealand coast.*—On the 4th March a Skua (*Megalestris antarctica*) made two cruises round the ship and then disappeared, his plump, rounded body and heavy flight rendering him very readily distinguishable on the wing. He came near enough to the ship to make the white spot at the base of the primaries distinctly visible.

And again in my diary for 1894:

> February 22nd.—Wind has veered round to S.S.W., and there is a heavy swell. Unusually cold for this latitude and this season of the year: water 45° Fahr., and the atmosphere, in the shade, 48°. On Saturday the temperature of the water was 70° Fahr. The reading in the shade yesterday was 51°, and the day before 61°. But the inequality of temperature of the atmosphere in these latitudes is sometimes very remarkable.

Captain Kempson tells me that on his last voyage Home, when in sight of Cape Horn, the temperature in the sun was 85° Fahr., whilst in the shade, on the other side of the ship, the thermometer stood at 50°. This is almost as curious as Captain Scoresby's report that at 80° north latitude he had the pitch melted on one side of his ship by the heat of the sun, while water was freezing on the other side, owing to the coldness of the air. Now that we are getting beyond the influence of the warm current from the Mozambique, birds are getting more numerous; a few *Diomedea exulans*, a splendid pair of *D. regia*, and six of *Phœbetria fuliginosa* (the 'Cape Hen' of sailors) remained with us nearly all day. When about sixty miles from the Crozets a fine Skua (*Megalestris antarctica*) appeared among them, and instantly gave battle to a Sooty Albatros. Before finally leaving us, he mounted high overhead and took a good survey of the ship.

MEGALESTRIS MACCORMICKI.

(MACCORMICK'S SKUA.)

Megalestris maccormicki, Saunders, Bull. Brit. Orn. Club, vol. iii., p. 12 (1893).

I have now to add this Antarctic form to the New Zealand list. There is a fine male specimen, in full plumage, in my collection, which was obtained under the following circumstances. In the summer of 1895 I accompanied Lord Ranfurly and party to Stewart Island, in the Government steamboat 'Tutanekai,' and whilst lying in Paterson's Inlet, a large Skua was seen hovering daintily over the surface of the water with its legs dangling. A member of his Excellency's suite took a long shot with a pea rifle, and it was evident that the Skua was badly hit, for it turned a half-somersault in the air, and then made in a bee-line for the open sea. After flying about three-hundred yards, it collapsed and dropped into the water. A boat was sent out to pick up the bird, and immediately on taking it into my hands I saw that it was distinct from *Megalestris antarctica*. On dissecting the specimen I found that the ball had passed right through the body, just above the tail; so the bird had exhibited a marvellous amount of vitality.

With Dr. Sharpe's assistance I have compared it with the type specimens in the British Museum (four in number) of *Megalestris maccormicki*, and the species is undoubtedly identical.*

* It is thus characterised by Mr. Saunders:—"*Ad.* much paler than *M. antarctica*; crown olive-brown; acuminate feathers of the nape and neck all round slightly marked with golden straw-colour, with the upper breast streaked with the same, though in a less degree; the remaining under-surface gradually darkening to coffee-brown on the abdomen, with the wings and tail chiefly umber-brown, as in *M. antarctica;* bill blackish, short and stout; tarsi and toes black. Total length, 21 inches; wing 15·5, tail 6·5, culmen 2·3, tarsus 2·6, middle toe and claw 2·7."

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STERCORARIUS CREPIDATUS.

(RICHARDSON'S SKUA.)

Stercorarius crepidatus (Gmelin), **Buller, Birds of New Zealand, vol. ii., p. 66.**

Mr. A. T. Pycroft sends me the following interesting note from the Bay of Islands: "Skua-gulls are sometimes seen here in the summer. Only a fortnight ago, when I was out fishing at the Rawhiti, I saw three of these birds. As a rule, I have found them following flocks of the Antarctic Tern, when the latter are fishing. The Skua singles out a Tern which has a fish, and frightens it so that the Tern cries out, and, as a rule, drops the fish; then the Skua, with great quickness, secures the prize before it reaches the water. While this is going on some of the other Terns fly round the assailant screeching, but they do not venture to attack it. Shortly after I came here, when pulling up the Waikare River, I saw a Tern trying to evade the attack of a larger bird of dark plumage; however, the poor Tern had no chance against its powerful enemy who struck it, causing it to fall into the water. I was surprised to see the assailant settle down in the water and lift up the Tern, flying off with it about 200 yards, when it was dropped. I pulled up, and on my approach the large bird flew away. The Tern was quite helpless when I picked it up, but it recovered later on; however, it died next morning. I think the bird that struck it was a Skua-gull, but of this I am not certain." Probably this was the larger form, *Megalestris antarctica*.

In a later note he states that these birds are plentiful from October and November till April, and that on one occasion he counted as many as six between Opua and Russell.

I have recorded several instances of the occurrence of this species in Wellington Harbour. The last specimen that came under my notice (an adult bird) was taken on the Wairarapa Lake, about fifty miles from Wellington.

Dr. Ramsay, writing of the birds of Australia, states that of this species stragglers are occasionally found on the southern coasts.

ARENARIA INTERPRES.

(TURNSTONE.)

Strepsilas interpres (Linn.), **Buller, Birds of New Zealand, vol. ii., p. 14.**

I have nothing to add to my account of this species, except that of late years it appears to have increased considerably both in the North and South Islands.

HÆMATOPUS LONGIROSTRIS.

(PIED OYSTER-CATCHER.)

Hæmatopus longirostris, Vieill.; **Buller, Birds of New Zealand, vol. ii., p. 16.**

Young of the First Year.—Differs from the adult in having the white of the under-parts intermixed with the black in about equal proportions, there being no pectoral line of demarcation. The lining of the wings is varied with white, in an irregular way, down the line of the humerus; the quills are greyish-white towards the base on their under-surface, and the under tail-feathers are tipped with white. The secondary coverts are white in their outer portion, but on one web only, the alar-bar being somewhat broken along the edges; and the under tail-coverts are narrowly margined with white. The specimen from which these notes are taken was captured at the Pelorus Sound in the month of January.

This fine species of Oyster-Catcher is to be found, sparingly distributed, on the coasts of New Zealand, Tasmania, and Australia, but does not appear to range further north than the southern shores of New Guinea.

As it is always pleasing to me to see Dr. Finsch's name associated with the New Zealand avifauna, for which he has done so much, I am sorry that I cannot admit *Hæmatopus finschi*, as characterised by Von Martens (Om. M.B. v., p. 190, 1897) on the authority of a specimen from Saltwater Creek, Canterbury, and now in the Natural History Museum of Hamburg. He describes it as differing from the typical *H. longirostris* in the white markings on some of the primaries and the total whiteness of the tertiaries; also by having white flanks, although he adds that he does not attach much value to this last character, there being two almost exactly similar specimens in the Berlin Museum in which the flank spots are varied with black. I conclude that the differences indicated are merely individual ones and due to partial albinism.

HÆMATOPUS UNICOLOR.

(BLACK OYSTER-CATCHER.)

Hæmatopus unicolor, Wagler; **Buller, Birds of New Zealand, vol. ii., p. 18.**

IN February, at the mouth of the Ohau River, I saw a pair of these birds attended by two young ones, which perpetually ran after their parents, after the manner of young Sea-gulls. I particularly noticed that the young birds were *pied*, but in dull plumage, like the specimens in the Canterbury Museum.

I kept a young one in my garden for some time. It never lost its natural timidity of character, and would always run away on my approach. Enjoying full freedom, it always made for the high ground and seemed never tired of running up the paths on the garden slope. In addition to being shy, it was a very stupid bird. When driven along a garden path to its extremity, instead of making its escape by turning off the path it would always turn back, and rush past screaming.

Like its congener, *H. longirostris*, the Black Oyster-Catcher is a resident on the coasts of Tasmania and Australia as well as New Zealand. It is very similar to the American black form, but may be distinguished by the bright red colour of its legs, those of the latter being pale flesh-colour.

LOBIVANELLUS LOBATUS.

(AUSTRALIAN MASKED PLOVER.)

Lobivanellus lobatus (Latham), **Buller, Birds of New Zealand, vol. ii., p. 13.**

In vol. ii., p. 13, I have described a straggler of this beautiful species of Plover, obtained by the late Mr. Drew at Kai-iwi, near Wanganui, in August, 1886. The specimen is still in the interesting little museum, at Wanganui, founded by him.

The occurrence was first recorded by Mr. T. W. Kirk ('Ibis,' 1888, p. 45), but he erroneously referred the bird to *Lobivanellus personatus*.

The distinguishing features in this bird are the lobed mask of pale sulphur-yellow, and the sharp spur, more than half an inch in length, at the bend of the wing.

Mr. C. A. Barton, writing to me from Hokitika, describes what is certainly either *Lobivanellus lobatus* or *L. personatus*, of Australia, as occurring there. He says: "Can you inform me if there is in Australia a spur-winged wader about the size of an Oyster-catcher? Several times lately I have observed a *rara avis* on the sandbanks of the Hokitika River that, from what I have been able to observe through a field-glass, would be classed between the Dottrels and the Oyster-catchers; but I am nearly sure that it has well-developed spurs (say half an inch long) on the wings, and a flap-wattle (pale-yellow) covering the sides of the face and extending back to and close round the eyes. And the bill, I think, is soft or rather weak, and about half as long again as the head." I refer this bird to *L. lobatus*, because the one obtained at Kai-iwi was of that species.

CHARADRIUS DOMINICUS.

(EASTERN GOLDEN-PLOVER.)

Charadrius fulvus, Gmelin; **Buller, Birds of New Zealand, vol. ii., p. 6.**
Charadrius dominicus, P. L. S. Müller, Syst. Nat. Anhang, p. 116 (1776).

Forming one of the Tonga Archipelago, and about 150 miles from Faunalai, in the Vavau group, is the remarkable, volcanic island of Nuia-Foou, situated in about 15° South latitude. It is very small, being only about twenty miles in circumference, but it is quite unique in its way. Its centre consists of a basin of brackish water, three miles across, presumably an ancient crater, and of such depth in the middle that it has never been fathomed. There are no fishes of any kind in its waters, and it does not appear to have any communication with the sea. The surface of this inland lake, on which there are three beautiful wooded islets, is generally perfectly tranquil, whilst the sea outside the rim or circle of land, on which the people live, beats in roaring billows upon the outlying reefs. On this volcanic margin several hundreds of natives reside and, in spite of its arid and almost waterless character, cannot be induced to leave the home of their fathers. It is among the black sand-dunes around this lake, as already stated (p. 32), that the curious ground-bird, the Malau (*Megapodius pritchardi*) forms its deep burrow and deposits its solitary egg, leaving it to be hatched out by the natural heat of the ground.

In a small consignment of birds (in formalin) received from Mr. W. B. Hamilton, just before he left the Island, there was a fine specimen of this almost cosmopolitan Plover. It is said to have become a permanent resident in some parts of the Tonga group.

I have a specimen in my collection, received from Mr. Wilson, junior, of Bulls. In sending it, he wrote that he had never seen the bird before, but was told by others that a few stray ones generally frequent the Rangitikei beach, about the end of October, every year.

Captain Hutton writes *:

> In New Zealand the bird is rare, having been only recorded a few times in the North Island, while for the first time in history it made its appearance in the South Island last summer (1900). Mr. W. W. Smith says that he has seen a good many in the Ashburton River bed, the first he had noticed for eighteen years. There is a specimen in the Canterbury Museum, which was shot at Lake Ellesmere in November, 1900; and I saw another specimen which had been shot at the Bluff, in Southland. Two specimens shot near Auckland early in December, 1880, were in winter plumage, but showing signs of being about to put on their summer dress. The specimen in the Canterbury Museum is in winter plumage, as also is the one shot at the Bluff; and Mr. Smith says that the plumage of the birds in the Ashburton River bed varied but slightly. But Sir W. Buller has received a specimen from Mr. C. H. Robson which had partially assumed the summer plumage. Mr. Robson also found a pair breeding at Portland Island on the 9th January, and, as he says that the birds undergo little or no change of plumage from winter to summer (which is a mistake), I presume that the birds he saw were also in the winter or non-breeding plumage. This is very remarkable, for with introduced European birds, such as the Starling, Linnet, and Redpole, the change of plumage goes with the breeding-season, as it did in Europe; on coming into the Southern Hemisphere, they have changed together.

A year later (April 9th, 1901) Captain Hutton wrote to me: "There have been a good many Spotted Plover (*C. dominicus=C. fulvus*) in the South Island this year. They do not seem to have been recorded before, and none of the taxidermists of the South Island know them." And, again, on April 11th, 1902: "Last month Mr. Edgar Stead shot a Golden Plover at Lake Ellesmere in the *breeding plumage*—the first I have seen. It is interesting to see this bird getting its spring plumage here in the autumn before it starts north."

* *Trans. N. Z. Inst.*, vol. xxxiii., p. 256.

OCTHODROMUS OBSCURUS.

(NEW-ZEALAND DOTTREL).

Charadrius obscurus, Gmelin; **Buller, Birds of New Zealand, vol. ii., p. 1.**

Mr. Marklund has sent me two skins of this well-known species, in summer plumage, which he obtained on Table Hill, Stewart Island, at an elevation of 2,100 feet above the sea-level, and at a distance of fully eight miles from the coast, with heavy intervening bush-country. They were breeding there, for he saw young ones in down.

OCTHODROMUS BICINCTUS.

(BANDED DOTTREL.)

Charadrius bicinctus, Jard. & Selby; **Buller, Birds of New Zealand, vol. ii., p. 3.**

I have described (vol. ii., p. 2) the young state of this beautiful Dottrel. I have now a series of seven specimens, showing the different states of plumage in the progress of the bird towards maturity: No. 1 is in the first plumage, with an indistinct zone of mottled grey encircling the foreneck; No. 2 has a broader and darker zone; Nos. 3 and 4 have it still darker, the centre of each feather being blackish-brown or black, one of them presenting a faint indication of the second band; No. 5 exhibits this pectoral band, the chestnut being mixed with white, and consequently indistinct; Nos. 6 and 7 (adult ♂ and ♀) present the double bands of black and chestnut respectively in full perfection.

I have in my collection a specimen, obtained at Kaikoura, in which the chestnut band is considerably broader than in ordinary specimens.

ÆGIALITIS RUFICAPILLA.

(RED-CAPPED DOTTREL).

Charadrius ruficapillus, Temminck; **Buller, Birds of New Zealand, vol. ii., p. 5.**

So far as I am aware, no further specimens have been obtained.

THINORNIS NOVÆ-ZEALANDIÆ.

(NEW-ZEALAND SHORE-PLOVER.)

Thinornis novæ-zealandiæ (Gmelin), **Buller, Birds of New Zealand, vol. ii., p. 11.**

In a case of stuffed birds, at Invercargill, on the occasion of my last visit, I observed the young of the above rare species, the specimen, as I was informed by the taxidermist, having been obtained at the mouth of the Cargill River.

I learn by letter that in a collection of birds made by Mr. Palmer at the Chatham Islands, and taken to England, there was a perfect albino specimen of this very handsome Plover.

Eggs from the Chatham Islands assigned to this species are of the shape and size of the Banded Dottrel's egg; one is somewhat smaller and of a more pyriform type. They are of a creamy or very pale brown tint, sprinkled all over, but more thinly at the larger end, with minute spots of brown, which form into a distinct zone about one-third way down. The smaller egg mentioned above is of a greyer tint, coming nearer in that respect to the Dottrel's egg.

The late Mr. Potts, who visited the Chatham Islands, reported that on October 3rd, he found the species breeding on a small rocky islet—about five acres in extent—one of the group called the Sisters, or, by the Maoris, Rangitutahi. The eggs, three in number, just fit the slight nest of a few grass-leaves twisted into a circular form. They vary very much both in shape and individual colouring.

Dr. Forbes, who also collected the eggs of this species on the Rangitutahi Islets, states that their ground colour is olive-buff, marked pretty evenly all over, but more abundantly at the larger end, with fine spots and fine linear streaks and markings of clove-brown, often becoming almost black. He describes the egg as pyriform in shape and measuring 1·42 inches by 1·02 in. He figures two of these eggs, illustrating the variation in colour and markings, as well as a newly hatched nestling, in the 'Ibis' for 1893 (Plates XIV. and XV.). The nestling has the true Plover character and is a charming little creature, variegated yellowish-brown on the upper surface and white on the under, with a blackish-brown stripe over the vertex and another, less pronounced, through each of the eyes.

THINORNIS ROSSI.

(AUCKLAND-ISLAND SHORE-PLOVER.)

Thinornis novæ zealandiæ, Gray; **Buller, Birds of New Zealand [in part], vol. ii., p. 11.**
Thinornis rossi, G. R. Gray, Voyage Ereb. & Terr., p. 12, pl. 11a (1844).

Dr. Sharpe has admitted this bird (hitherto supposed to be the young of *Thinornis novæ-zealandiæ*) into the list as a good species, the type now in the British Museum, having come from the Auckland Islands, whereas *T. novæ-zealandiæ* belongs to the Chatham Islands. He thus distinguishes it in the 'Cat. Birds' Brit. Mus. (xxiv., p. 306):—

Adult.—Similar to *T. novæ-zealandiæ*, but differing in the much darker colour, which is uniform brown, and by having the sides of the body extensively mottled with brown, the basal portion of the feathers being of that colour. Total length 7·5 inches; culmen 1 in.; wing 4·8 in.; tail 2·4 in.; tarsus 0·95 in.

Further specimens should be obtained before this matter can be considered settled.

ANARHYNCHUS FRONTALIS.

(WRY-BILLED PLOVER.)

Anarhynchus frontalis, Quoy et Gaim; **Buller, Birds of New Zealand, vol. ii., p. 9.**

By the Maoris this bird is called Ngutu-parore, in allusion to the peculiar formation of its bill.

In the summer of 1895 I received a large number of specimens (in spirit) from Captain Mair, who shot them on the extensive flats at the mouth of the Piako River. Here they are to be seen in thousands, and are so tame that you may knock them over with a stick. They frequent the shallow fresh-water swamps, a mile or so from the shore, where they are busily employed feeding on nahonaho, or midges, which affect the damp ground in countless millions.

Nestling.—In the Canterbury Museum there is a newly-hatched nestling of this species, in which the bill is asymmetrical, as in the adult. The chick is covered with white and grey down, with clouded dark markings on the back.

Mr. A. T. Pycroft writes to me from Helensville: "I have spent several days on the Kaipara mud-flats, and I find the Wry-billed Plover, the Banded Dottrel, and the Black Oyster-catcher plentiful. The Pied Stilt is also fairly plentiful. If I remember aright, you mention in your 'Birds of New Zealand,' that this species is rarely found as far north as this, but the bird is evidently increasing. A short time since a White Heron in splendid plumage, and with ample dorsal plumes, was shot near the South Head by Mr. Wilson, of Parkhurst."

HIMANTOPUS PICATUS

(WHITE-HEADED STILT.)

Himantopus leucocephalus (*nec* Gould), **Buller, Birds of New Zealand, vol. ii., p. 21.**
Himantopus picatus, Ellman, Zool., 1861, p. 7470. *

In spite of its disproportionate length of leg, this Plover is graceful in all its movements, and Mr. Keulemans has caught, very successfully, the beautiful poise of its body in the life-like portrait which appears in vol. ii. It is a very pretty sight to watch a scattered flock of these birds feeding

* So named by Mr. J. B. Ellman who, in 1861, communicated an article to the 'Zoologist' in which, with more than commendable zeal, he imposed new latin names on nearly the whole of the New Zealand birds! These names have always been ignored by ornithologists, but by chance the present one comes into recognition, and it happens to be appropriate.

along the fringe of a lagoon, posturing as it were from time to time, and assuming a variety of artistic attitudes. But, although endowed with such phenomenal stilts, I have never seen them wade into deep water—as a rule, just far enough in shallow water to cover the feet—and, although Dame Nature must have a wise purpose in everything, it is difficult to imagine what practical benefit the long legs are to the owner in the general economy of life.

Dr. Sharpe declares ('Catalogue of British Museum') that we have, all along, been mistaken in considering our bird the same as *H. leucocephalus*, of Australia. He states that none of the specimens in the British Museum referable to that species have come from New Zealand. He considers our bird specifically distinct: and I accept his conclusion.

Young.—A specimen in the Southland Museum has the back brownish-black; the foreneck and the underparts white.

Dr. Forbes treats our bird as a sub-species of *H. leucocephalus*, a view from which I entirely dissent.

Mr. Robert A. Wilson, of Bulls, writes me: "Both the Pied Stilt and the Red-breasted Dottrel nest freely on the river-bank here [Rangitikei]. They build very low, and their nests are often, on that account, destroyed by floods. One pair of Stilts had their nest destroyed three times in succession in one year, but they formed a fourth, and reared a brood."

HIMANTOPUS LEUCOCEPHALUS.

(WHITE-HEADED STILT.)

Himantopus leucocephalus, Gould; **Buller, Birds of New Zealand, (in part) vol. ii., p. 21.**

Dr. Sharpe has shown that our black-and-white Stilt-Plover is distinct from the Australian species and has referred it to *Himantopus picatus*, Ellman. The range of this species does not extend further north than the Hawke's Bay district. But, there is at least one well authenticated instance of the occurrence of the true *Himantopus leucocephalus* in New Zealand —doubtless a straggler from Australia. It was shot in the Lower Waikato district, near the city of Auckland and was preserved by the local taxidermist, Mr. C. Winch, in 1854. I had many opportunities of examining it, immediately after it was skinned. and satisfied myself of its absolute identity with the Australian bird. I have long had a suspicion that the southern form was distinct.

HIMANTOPUS MELAS.

(BLACK STILT.)

Himantopus novæ-zealandiæ (Gould), **Buller, Birds of New Zealand, vol. ii., p. 24.**
Himantopus melas, Hombr. and Jacq., Ann. Sci. Nat. (2) xvi., p. 320 (1841).

The Black Stilt, both sexes of which, in the adult summer plamage, are entirely black, is readily distinguishable from all the other members of the group. It frequents the same localities as the Pied Stilt, but is less gregarious in its habits, being generally associated in couples.

The bright red legs and red eyes, as in the case of *Hæmatopus unicolor*, present a striking contrast to the black plumage.

The following is a description of an almost entire albino which I have had an opportunity of examining: The whole of the plumage is white, stained more or less with ash-grey, especially on the upper parts, being darkest on the crown and sides of the head; among the wing-coverts and in the region of the back a few widely-scattered black feathers; quills and tail-feathers white freckled with grey; inner lining of wings dark ash-grey, as on the crown. Bill and feet normal.

A specimen afterwards came into my hands in which there were scattered white feathers on the foreneck and on all the under parts.

Mr. J. C. McLean describes ('Ibis,' 1892, pp. 252-3) what he considers a case of interbreeding with *Himantopus picatus*. He shot the pied bird, and gives a description of it, the black one escaping. The description shows clearly enough that the bird was not *H. picatus*, but a younger state of *H. melas*; and, that being the case, the birds were breeding true. On turning to my description of the young of *H. melas*, it will be seen that it has the throat and breast white. Dr. Sharpe, after examining a considerable series, writes: "I believe that the back and rump always remain black in the young bird."* Mr. McLean states that in his bird the tail was ashy-black. On this point of interbreeding, I still adhere to the view I advanced in opposition to Mr. Seebohm. I know it is very convenient to overcome a difficulty in plumage by a suggestion of hybridism; but, although common enough in cases of captivity, according to my experience, hybridism among animals in a wild state is a very rare occurrence.

HIMANTOPUS ALBICOLLIS.

(WHITE-NECKED STILT.)

Himantopus albicollis, Buller, Birds of New Zealand, vol. ii., p. 27.

I have nothing to add to what I have already put forward in support of this new species.

* Cat. Birds, B. M., vol. xxiv., p. 324.

RECURVIROSTRA NOVÆ-HOLLANDIÆ.

(RED-NECKED AVOCET.)

Recurvirostra novæ-hollandiæ, Vieillot; **Buller, Birds of New Zealand, vol. ii., p. 20.**

Among the rarer forms of our Waders, this beautiful Red-necked Avocet (presumably a visitant from Australia) holds a conspicuous place.

I have recorded (*l.c.*, vol. ii., p. 20) the only instances, within my knowledge, of the occurrence of this graceful Plover in the colony.

There are very few New-Zealand specimens in existence. There are three in the Otago Museum—two from Jackson's Bay, and one from Whakatipu Lake—two in the Canterbury Museum, one in the Colonial Museum; two in my own collection; and one, if not two, in the Rothschild Museum at Tring.

Although the western and southern portions of Australia appear to be the home of this species, it is apparently a rare bird even there, for Mr. Gould states he never met with it himself during his rambles in New South Wales, and had "only seen it now and then in collections from those parts." It is called Yä-jin-goo-rong by the aborigines of Western Australia.

NUMENIUS CYANOPUS.

(AUSTRALIAN CURLEW.)

Numenius cyanopus, Vieill.; **Buller, Birds of New Zealand, vol. ii., p. 45.**

The Australian Curlew differs very slightly from the American form (*Numenius longirostris*); but it may be readily distinguished by the colour of the under parts which are nearly white, streaked and transversely barred with brown.

This bird breeds in south-eastern Siberia, from Lake Baikal to the mouth of the Amoor, passes along the coasts of Japan and China on migration, and crosses the line to pass the winter in Australia, where, at that season, it is very numerous.

The occurrence of a straggler in the Manukau Harbour, near Auckland, is recorded in the proceedings of the Auckland Institute (February, 1897).

NUMENIUS VARIEGATUS.

(AUSTRALIAN WHIMBREL.)

Numenius uropygialis, Gould; **Buller, Trans. N. Z. Inst., vol. xxv., p. 60.**
Numenius variegatus, Scop., Del. Flor. et Faun. Insubr., ii., p. 92 (1786).

This species must be added to the New Zealand list. A specimen (now in the Colonial Museum) was shot by Mr. S. Liardet in the Wairau district, and was presented by the late Mr. W. T. L. Travers to the Museum. The bird agrees exactly with Gould's description of this species in the 'Birds of Australia,' but he curiously omits to notice that the sides of the body and under surface of wings are conspicuously marked with arrow-head bars of blackish-brown, and that the long axillary plumes are transversely barred in their whole length with the same. This specimen measures: Extreme length, 17 in.; wing, 9 in.; tail, 3·5 in.; bill, along the ridge (following curvature) 2·35 in., along the edge of lower mandible, 2·5 in.; bare tibia, 1 in., tarsus, 2·25 in.; middle toe and claw, 1·6 in.

The only other example I have since heard of is the specimen in Mr. Townson's collection. This was shot on the Westport beach in December, 1893.

MESOSCOLOPAX MINUTUS.

(LITTLE WHIMBREL.)

Numenius minutus, Gould, Proc. Zool. Society, 1840, p. 176.

I have added this species on the authority of Captain Hutton, who wrote me on October 25th, 1900: "A new bird has been added to our list of stragglers. The Little Whimbrel, *Mesoscolopax minutus*. Two were seen last June and one of them was shot. I have secured this specimen for our Museum."

This very nomadic species breeds in Eastern Siberia and Mongolia and passes through Japan and China on its migration to the Moluccas and Australia. In New Zealand it can only be an occasional straggler.

LIMOSA NOVÆ-ZEALANDIÆ.

(SOUTHERN GODWIT.)

Limosa novæ-zealandiæ, Gray; **Buller, Birds of New Zealand, vol. ii., p. 40.**

I do not think I have anything to add to my account of this species; but an interesting discussion has taken place in the newspapers which is well worth reprinting, because it will tend to keep alive the public interest in our local Natural History. Thus, the *New Zealand Herald* published the following:—

THE GODWITS OF SPIRITS BAY.

Under the above title, the 'English Illustrated Magazine' publishes a most graphic and interesting article on the migration of the Godwit, or Kuaka, from New Zealand to Siberia. We do not suppose that many of our readers were aware that this bird, which is common on all the coasts of the North Island during the summer, flies away in the winter months and breeds in the extreme north of Siberia. It is not many years ago since the fact was discovered, but it is now ascertained without doubt, and is fully dealt with by Sir Walter Buller in his great work on the birds of New Zealand. It is singular that the Kuaka, if it wants a cold country to breed in, should not go to the Antarctic regions, but wings its long flight to near the North Pole, crossing the Equator and traversing the tropical regions of Asia. In the old days, the Maoris noticed that the bird did not breed here, and it became a proverb, 'Who has seen the nest of the Kuaka?' In 1868, Mr. Dall observed two specimens at Kutlik, in Alaska. Sir Walter Buller, in referring to the subject, says: 'To my mind, in the whole romance of natural history, there is nothing to be compared with this astonishing migration.' The following is the article of the 'English Illustrated Magazine':—

As New Zealand approaches its northern extremity the narrow neck of high flat land sinks away to a wilderness of sandhills, and then, as if rebounding like a ball, suddenly springs upwards, to culminate in a bold headland which comes down sheer into deep water. This headland is Te Reinga, the earthly portal, according to the belief of the old New Zealander, by which disembodied spirits entered the realms of the dead. Eastward of this promontory is a bay—Spirits Bay—girded with sand. The place poetically takes its name from the old Maori superstition. At night, when the natives heard the rustle of the wings of some belated bird passing overhead, they whispered to one another that a spirit was passing to its rest. It is a wild spot, swept by eternal winds. No habitation of man is to be seen, no pathway to be found; to the imagination it is just the sort of place where, at the end of the world, the last New Zealander would be likely to be found, cowering over a few smouldering embers, waiting for death.

But it is not from an ancient superstition of a race that is passing away that this dreary and inhospitable place derives its principal interest. It possesses an attraction far stronger than this to fix our attention. For fifty weeks in the year it is neglected and empty, the intense solitude which broods over all things seeming a presence in the air. Then, of a sudden, when March is drawing towards a close, it springs, as if by magic, into a fever of life, and becomes the scene of one of the most remarkable sights in nature. Of all the spots to see the Kuaka fly from the shores of New Zealand, Spirits Bay is the best. In autumn at the Antipodes flocks of Kuaka, in numbers of fifty to one thousand, flying always in the form of a crescent, may be seen trending up the coast towards Te Reinga. The stream is so continuous that it is remarked even by those who concern themselves little about such matters. Before April is three days old they have collected upon the sands of Spirits Bay in countless numbers, preparatory to their long flight to Asia.

Some years ago, I witnessed the departure of the Kuaka. It was a scene upon which my memory lingers. I made the latter part of the journey in tempestuous weather, a heavy rain being drifted into my face by a strong northerly wind. As I stumbled across the belt of sandhills which fringed the shore, a strange sound, that half oppressed and half soothed the ear, became fitfully audible—a sound which, when a little later, a gust of wind caught it and brought it to me in greater volume, drowned for a moment the moaning of the sea. I knew it to be a chorus of querulous cries proceeding from innumerable little throats, and, racing up the last ridge of sand which lay between me and the bay, I stood looking at the sight I had come so far to see. The beach was literally covered with Kuaka; they seemed to be all indiscriminately huddled together where there was no room for half the number, while thousands were hovering overhead in a vain attempt to find a footing, or were trampling upon the backs of their fellows in the hope of ousting them from their places. From time to time the breaking surges sent the salt spray leaping far towards the land, whereat a grey cloud went whirling into the air with deafening clamour, to discharge itself again, after a few moments of rapid variation in density, upon the sands. What with the lowering clouds, the wild and stormy ocean, the low, mournful sound which the wind drew from the thin, wiry grass of the sandhills, with the swarm of birds which looked like grey billows in convulsion, it was altogether a peculiar and an interesting sight; and, natural though it was, it seemed unnatural. During the afternoon flocks of Kuaka kept pouring into the bay, each new lot adding to the mad unrest which made all the atmosphere. As the day wore on the wind veered round to the west, the clouds fell asunder, the rain ceased, and a watery sun pressed softly out and tinged the sky and sea and land with a faint silvery lustre. Sunset by the shore is always a solemn time, and as the brief day drew towards its close, I forgot the birds in the poetry and beauty of the hour.

I was recalled to practical matters by a sudden and violent ferment among the Kuaka. Frequently they rose with a mighty rustle of beating pinions. After circling about in the air in an agitated and undecided manner, they settled again. At length, just as the sun was dipping into the sea, an old cock uttered a strident call, clarion clear, and shot straight into the air, followed by an incalculable feathered multitude. Higher and higher rose the host until it was but a stain in the sky. At this stupendous altitude—in a moment of time, as it seemed—the leader shaped his course due north, and the stain melted into the night. It was very impressive. There was something of the solemnity of a parting about it.

In this manner, and for ten days, flocks of Kuaka continually arrive at and depart from Spirits Bay. At the expiration of that time the fleeting scene is closed, nothing remaining but a few scattered feathers to show that it once existed. We are not able to follow it in its flight but conscientious observers have noted its progress up the coast of Asia, and they tell us that in the first days of June the Kuaka has reached a latitude in frigid Siberia as high as 74 degrees north. With the coming of August—having meanwhile reared its brood—it begins the voyage to its southern home. As the young birds are at this time incapable of an extended flight, it returns much more leisurely than it went. On the way back, it touches at many of the numerous clusters of islands in the three zones of the Pacific Ocean. The spring sunshine at the end of October welcomes the wanderers home to Te Reinga. The following April, at the same time as that of the previous year, even upon the same day—and this is a circumstance full of interest, for the advent and departure of migrants is in every other case regulated by the forwardness or lateness of the season, as the case may be—the Kuaka again collects upon the sands of Spirits Bay, to fly away to Asia.

A contributor to that journal, under the *nom de plume* of "The General," and the heading of 'The Kuaka's Mistake,' writes thus thoughtfully:—

The account of the migration of the New Zealand seafowl, the Kuaka, to its breeding place in the northern parts of Asia, as given in last Saturday's Supplement of the 'Herald,' is of singular interest. Well may Sir Walter Buller say that in the whole romance of natural history there is nothing to be compared with this astonishing migration. That its instincts should lead the bird to brave the tropical heats extending over the whole torrid zone, in order to reach the cold region beyond in northern latitudes, while it could find as much cold as it wants nearer home by steering south to the Antarctic regions, seems at first sight an instance of animal instinct blundering. The observers and scientists do not appear, however, to have thought out the reason of this strange and unreasonable migration. But it seems to me that the phenomenon, wonderful though it is, is easily enough explained, and that it is dependent on the fact that the centre of distribution of this, as well as all other winged life, was in the Northern Hemisphere. Assuming this generally accepted theory of the genesis of animal life to be correct, the early progenitors of the Kuaka, somewhere about the Persian Gulf, were accustomed to seek their nesting place in those cold latitudes which were nearest them in the Northern Hemisphere. Then, as they and their descendants pursued the gradual system of colonisation further and further south, until eventually they reached the coasts of New Zealand, not merely instinct, but the experience of the older birds led them to continue the northward migration as the annual period for migration came round. I daresay that if we had only some way of reaching the intelligence of the Kuakas, they would be glad to hear that they could find the desired cold latitudes in the south, and so save themselves all that needless flight over half the globe. But just like ourselves, who have carried with us to these southern climes the customs and traditions of the habitat of the Anglo-Saxon race in the far north, these little birds inheriting the prejudices and traditions of their fathers continue to fly away from Te Reinga instead of turning about, as sensible and well-instructed birds might have done, and making a start from the Bluff.

Captain Hutton, in his interesting paper on 'Our Migratory Birds,'* makes the following remarks on this part of his subject:—

The shore-birds, such as the curlews, plovers, sandpipers—known as the *Limnicolæ*—wander much further, and travel down the shores of the Pacific and Atlantic Oceans, often crossing the equator into the Southern Hemisphere before halting. One such stream leaves eastern Siberia and, passing through China and Japan —where it picks up the Southern Snipe and the Red-capped Dottrel—continues to fly through the Malayan

* *Trans. N. Z. Inst.*, vol. xxxiii., pp. 251-264.

Archipelago into Australia and Tasmania, those birds which do not die on the way returning annually to their breeding-ground in Siberia and Kamtschatka. This statement may seem at first startling, or even incredible, but we must remember that a bird could easily travel from Kamtschatka to Tasmania in a month; so that, after the breeding-season was over in the Northern Hemisphere, there would be ample time for globe-trotting, if the bird felt so inclined. . . . . Of the living stream, already mentioned, a small branch, consisting of three or four species, leaves New Guinea for New Zealand. Of these the godwit (*Limosa novæ-zealandiæ*) is the best-known case. These birds breed in Eastern Siberia from June to the end of July, and then leave. In September, and again in April, they are found in China, some of them passing the winter in the Island of Formosa. Others arrive in August or September in Australia, Fiji, New Caledonia, and the New Hebrides from the north, and depart again northwards early in May. Stragglers go to Samoa and Tonga. In New Zealand many birds arrive during October, November, and December, spread as far south as Stewart Island, and leave at the end of March or the beginning of April. Some also visit the Chatham Islands; but they are not known to breed either in New Zealand or in Australia. In New Zealand they arrive in small parties, which evade observation, but they leave the North Cape district in large flocks, which have several times been seen to depart. This evidence of migration is sufficiently strong, but in addition we have that of the change of plumage. The Godwit is one of those birds which have different plumages in summer and in winter. In the Siberian summer, during breeding-time, the birds have their summer plumage; but in New Zealand they are nearly always in their winter plumage, although it is summer with us. A few exceptions in summer plumage have been noticed, and it is probable that these are birds which remained behind when the great April exodus took place.

I have only to remark here that birds in the rufous summer plumage are more frequent than Captain Hutton supposes. A collector in my service once came upon a small flock of them, near Collingwood, all of the birds in summer plumage, and out of these some half-dozen came into my possession. They were in their complete livery, but some others had only partially assumed the summer plumage.

Captain Mair, in a letter to myself, referring to the article in the 'English Illustrated Magazine,' remarks: "The writer made no reference to the very large number of these birds that remain in New Zealand throughout the winter. These sojourners must have a clerk of the weather of their own who predicted an unusually mild winter, for many thousands remained here this year. I never before saw them in such numbers at this season."

The native name is Kuaka; in the summer plumage it is called Kura, in allusion to its rich rufous colour.

Dr. Forbes, in his 'Bulletin,' treats this as a sub-species of *Limosa lapponica*; but Dr. Sharpe accords it, as I think rightly, full specific rank in his 'Handlist.'

There is a good series of specimens in the British Museum, and likewise in the fine collection of birds at Liverpool.

Mr. Seebohm summarises his account of this species by saying that the eastern colony of Bar-tailed Godwits pass the coasts of Japan, Manchuria, and China on migration, and winter in the islands of the Malay Archipelago, Australia, the New Hebrides, Norfolk Island and New Zealand.

Middendorf* gives a coloured figure of the egg of this Godwit, but he does not describe it, nor does he furnish any account of the nest, merely mentioning that it is very hard to find on the marshy meadows of the tundras. As represented in the plate, it is broadly ovate, measuring 2·2 inches in length by 1·5 in greatest breadth, and is of a dusky olive colour with numerous irregular spots over the entire surface.

Mr. Dall, who found a nest containing two eggs at Kutlik, Alaska, states that it was merely a rounded depression in a sedge tussock with a lining of dry grasses. Messrs. Baird, Brewer and Ridgway describe two eggs in their possession as of deep greenish drab and pale drab respectively in the ground colour, the blotches on the former being of a dilute umber and much more pronounced in the second specimen.

* Midd. Sibir. Reiss, Vög., pl. xix., fig. 5.

LIMOSA HUDSONICA.

(RED-BREASTED GODWIT.)

Scolopax hudsonica, Latham, Ind. Orn., vol. ii., p. 720 (1790).

An example was shot by Mr. Edgar Stead at Lake Ellesmere, and referred to this species by Captain Hutton, the identification of which was afterwards confirmed at the British Museum.

This being an interesting discovery was thus chronicled in the *Canterbury Press*:—

A Strange Visitor.—In pursuit of his efforts to furnish the authorities of the British Museum with a complete collection of the birds of New Zealand and the adjacent islands, Lord Ranfurly some little time ago enlisted the services of Mr. Edgar Stead, who has an extensive knowledge of the birds of this Colony and their habits. Armed with a permit from his Excellency, Mr. Stead therefore spent some days lately in the vicinity of Lake Ellesmere, and among the specimens he secured was one undoubted prize—a bird which he recognised as one of the Godwit family, but which differed in many respects from the Godwits usually found in New Zealand. The bird was shot near the mouth of the Selwyn River, and from its manner of flight, Mr. Stead believed it was setting out on the long journey which is undertaken by the Godwits, and is one of the marvels of animal migration.

Captain Hutton, curator of the Christchurch Museum, who has seen the specimen, says that, as far as he knows, the bird has never before been obtained in New Zealand. He thinks that the bird is a specimen of the American Godwit, although it does not agree exactly with the descriptions given of that bird, for the tail is tipped with white, and the bill and legs do not answer precisely to the descriptions. These birds, however change their plumage very much at different seasons, and the divergence may thus be accounted for. There are no specimens of the American Godwit in New Zealand with which the present bird can be compared, but there is a good collection in the British Museum available for comparison, and the experts there, to whom it is to be sent, will be able to identify it with little difficulty. Assuming that it is an American Godwit, Captain Hutton points out the extreme difficulty of explaining how the bird got into New Zealand. These Godwits breed in Alaska and Canada, and migrate backwards and forwards up and down the American Continent from Alaska and Canada to as far down as Patagonia. No specimen of this species has ever been seen or obtained in Australia, so that it seems strange that this particular bird could have crossed over from Alaska to Siberia and so down through the East to Australia, and thence to New Zealand. On the other hand, it is impossible to believe that the bird could have flown here across the Pacific, 'by the San Francisco route,' as it were, for Captain Hutton says the maximum distance that these birds can, it is believed, accomplish at one flight is 2,000 miles. However, Captain Hutton points out that it is useless speculating as to how the bird came to New Zealand, until it is proved that it is an American Godwit. The presence of one bird in the Colony indicates that there are, or were, others here.

Writing of this species Mr. Seebohm says:

The American Black-tailed Godwit, or Hudsonian Godwit, as it is called by the American ornithologists, may always be recognised by its dark brown axillaries and under wing-coverts. It breeds on the tundras of North America, above the limit of forest-growth, from Alaska to Baffin's Bay, but it is said to be very rare at the western extremity of its range. In autumn it migrates southwards and crosses the tropics to winter in the temperate parts of South America, where it has been obtained as far south as the Falkland Islands.

HETERACTITIS INCANUS.

(GREY SANDPIPER.)

Totanus incanus (Gmelin), **Buller, Birds of New Zealand, vol. ii., p. 33.**

I am not aware that any further examples of this Plover have occurred in New Zealand beyond the pair (male and female) added to my collection by the late Mr. C. H. Robson, who obtained them on Portland Island. A perusal, however, of this 'Supplement' will show that I was amply justified in the belief I expressed (vol. ii., p. 39) that from time to time other Australian Waders would join the ranks on our shores, if not as permanent recruits, nevertheless welcome enough as tending to enhance the value of our bird-collections and to keep alive the interest among our numerous local observers. I have only to mention such species as *Numenius cyanopus*, *N. variegatus*, *Limonites ruficollis*, *Mesoscolopax minutus*, *Ancylochilus subarquatus*, *Limosa hudsonica*, *Gallinago australis*, *Ardea cinerea*, *Plegadis falcinellus*, and *Pelecanus conspicillatus*, as having since been added to the list.

LIMONITES RUFICOLLIS.

(RED-NECKED SANDPIPER.)

Trynga ruficollis, Pallas., Reis. Reichs., vol. iii., p. 700 (1776).

Captain Hutton has added this species to our list. In a letter to me (August 2nd, 1902) he says: "Mr. E. Stead brought me a specimen on July 22nd, which he had shot near Lake Ellesmere. It was a female, well on in the breeding plumage, and with well-developed eggs. It would, I think, have laid the eggs in about a month of being shot. Another specimen, in non-breeding plumage, was I believe sent to the British Museum, by Lord Ranfurly, early in the year. Mr. Stead thinks, and I agree with him, that this bird is a resident with us, but has been overlooked, owing to its flying with the Dottrel." My belief is that it is only a straggler.

GLOTTIS NEBULARIUS.

(GREENSHANK.)

Scolopax nebularius, Gunner, Leem. Lapp. Beschr., p. 251 (1767).

Captain Hutton writes ('Trans. N. Z. Inst.,' vol. xxxiii., p. 253) that the Otago Museum contains a New-Zealand-killed specimen of this Plover, which was bought by himself in the market, as far back as 1874.

HETEROPYGIA ACUMINATA.

(MARSH SANDPIPER.)

Tringa acuminata (Horsf.), **Buller, Birds of New Zealand, vol. ii., p. 37.**

This bird (Kohutapu of the Maoris) associates with the flocks of Kuaka or Godwit; and I received some beautiful specimens from the low-lying river flats at the mouth of the Piako. It is very numerous in the Bay of Plenty, associating there also on the ocean sands with the Godwit, and being, as a rule, shy and difficult of approach.

The male birds have bright rufous breasts and a beautifully marked upper surface.

ANCYLOCHILUS SUBARQUATUS.

(CURLEW SANDPIPER.)

Scolopax subarquatus, Güldenst., Nov. Comm. Petrop., xix., p. 471 (1774).

I have added this species on the authority of the following letter to me from Captain Hutton under date of April 11th, 1903:—"Mr. Edgar Stead has added another to our list of migratory birds—the Curlew Stint, *Ancylochilus subarquatus*. At Lake Ellesmere, on the 5th April, he saw three specimens and shot two, both of which were females. One is in winter plumage, the other is just commencing to get some red feathers on the breast. Our migratory birds have been so little looked after that I cannot feel sure whether it is a chance or a regular migrant."

TRINGA CANUTUS.

(THE KNOT.)

Tringa canutus, Linn.; **Buller, Birds of New Zealand, vol ii., p. 35.**

Referring to Mr. Cheeseman's specimen shot by his brother in Hobson's Bay, I said, in my 'Birds of New Zealand,' (vol. ii., p. 36): "This is the first authentic record of this species in the North Island; but Captain Mair has described to me a bird found associating in considerable numbers with the Godwit on the East Coast, which I have no doubt is the same."

I have received some fine specimens of this cosmopolitan species, in both summer and winter plumage, from Cape Farewell. A male bird gave the following measurements: Length, 10·5 in.; extent of wings, 19·5 in.; wing from flexure, 6·5 in.; tail, 2·75 in.; bill, along the ridge, 1·25 in., along the edge of lower mandible, 1·12 in.; tarsus, 1·12 in.; middle toe and claw, 1·1 in.

The female is slightly smaller in all its proportions.

I have in my collection a specimen obtained in Pelorus Sound. It is prettily marked, and indicates the commencement of a change from winter to summer plumage, birds in the latter garb being extremely rare in this country.

GALLINAGO AUCKLANDICA.

(AUCKLAND-ISLAND SNIPE.)

Gallinago aucklandica (Gray), **Buller, Birds of New Zealand, vol. ii., p. 32.**

I have in my collection several examples of this rare Snipe (both male and female) from the Auckland Islands, and I find that the sexes are exactly alike in plumage. In an adult pair the female has the bill 0·25 inch longer than in the male; but this is usual with the Snipes. The length of the bill, however, is a very uncertain character; for another specimen in my collection, brought to me (in spirit) from the Auckland Islands, has a bill measuring 3 in. from the angle of the mouth to the tip, and 2·6 in. along the culmen.

As will be seen under that heading, I am in doubt about the propriety of recognising *G. huegeli*. An adult male obtained by Mr. Jennings during a visit to the Snares is undistinguishable from *Gallinago aucklandica*; and a very young bird of this species (partly in down) in the Otago Museum is striated in a similar manner to the so-called *G. huegeli*.

In a communication to 'The Ibis' relating to *Gallinago huegeli*, Canon Tristram made the following remarks: "There would appear to be three species of *Gallinago* in the islands round New Zealand: *G. aucklandica* in the Aucklands, *G. pusilla* in the Chathams, and *G. huegeli* in the Snares, all being sedentary, or nearly so, in their several localities. To these, further research will probably add a fourth from Antipodes Island, whence a single specimen has been received by Sir James Hector, who states it to be larger, darker in plumage, and with a more curved bill than the Auckland-Island species. Unfortunately he has not described it." Shortly after this a specimen was obtained by the Hon. Walter Rothschild, who described it at a meeting of the B.O.C., and dedicated it to Canon Tristram. ('Ibis,' 1874, p. 294.)

Dr. Sharpe says ('Catalogue of Birds,' vol. xxiv., p. 662): "Mr. Walter Rothschild has kindly allowed me to examine his large series of the Auckland-Island Snipes and their allies. I find that the type of his *G. tristrami*, from Antipodes Island, is a rufous specimen of the true Auckland-Island form, though at first sight it looks very distinct. Since he first described the species, however, Mr. Rothschild has received several more specimens from Antipodes Island, and he now agrees with me that *G. tristrami* cannot be separated specifically from *G. aucklandica*."

Dr. Finsch, evidently mistaking my *G. pusilla* for this bird, writes: "*Gallinago aucklandica*, Gray: I have examined a pair from the Chatham Islands forwarded by Dr. Hector."

GALLINAGO PUSILLA.

(CHATHAM-ISLAND SNIPE.)

Gallinago pusilla, Buller, Birds of New Zealand, vol. ii., p. 33.

I am more than ever satisfied of the distinctness of this species. I have received further examples of both sexes; and there are nearly fifty specimens in the Rothschild collection, all from the Chatham Islands.

Dr. Sharpe (in the 'Brit. Mus. Cat.') treats *G. pusilla* as a sub-species of *G. aucklandica*, adding these remarks: "This is the smallest of the Antipodean Snipes and is distinguished by its smaller bill and whiter body. It apparently does not occur anywhere but in the Chatham Islands." In his subsequently published 'Handlist,' however, he accords this Snipe full specific rank.

The same writer thus describes a nestling of this species (*l.c.*, xxiv., p. 664) :—

> Nearly uniform rufous brown, with a little dusky mottling, and a dusky line along the centre of the crown; the throat rufous brown; the rest of the under surface of the body somewhat paler; the sides of the face and region of the eye dull silvery grey.

Dr. Forbes ('Ibis,' 1893, p. 529) has described the egg of this Snipe, of which two examples are figured. He says: "In shape they are ovoid; in dimensions—1·5 + 1·12, 1·67 + 1·15, 1·5 + 1·1, 1·67 + 1·12. The ground colour varies from a dark pinkish to a dark ochraceous buff, covered with dark seal-brown spots and smudges, more thickly crowded round its widest circumference. Some specimens have pale lavender-grey blotches and spots round that region, which are more sparsely distributed over the rest of the egg. The smaller end is nearly free from spots."

In the same number of the 'Ibis,' Dr. Forbes gives an excellent figure of the nestling (pl. xv.). It is a comfortable-looking little creature, with a big head and very round body, which has a covering of buff-brown down, varied and freckled, especially on the upper surface, with blackish-brown.

GALLINAGO HUEGELI.

(THE SNARES SNIPE.)

Gallinago huegeli, Tristram, Ibis, 1893, p. 447.

Dr. Forbes, in his 'Bulletin,' treats this as a sub-species of *Gallinago aucklandica*, and *G. pusilla* likewise; but Dr. Sharpe now accords all three of them full specific rank in his 'Handlist'; and as to *G. pusilla* I feel sure that he is right, for the birds are very local and are easily distinguished. The differences are constant, and are appreciable at a glance. The Liverpool Museum contains six specimens of my *Gallinago pusilla;* but there is, I believe, as already stated, a series of from forty-five to fifty in Mr. Rothschild's Collection at Tring, all of them having been procured at the Chatham Islands.

As to *G. huegeli* being really distinct I am a little in doubt, for some specimens I have examined come perilously near to *G. aucklandica.** I am bound to admit, however, that the specimens in my collection are uniformly darker than my examples of the Auckland-Island Snipe.

It is only fair that I should quote what Canon Tristram says on the subject (Bull. O. C., June, 1893) :—

> In the 'Ibis' for 1869, p. 41, Sir W. Buller described a second species [of Snipe] from the Chatham Islands as *Gallinago pusilla*. Very few specimens have been received, but the species has twice been obtained in New Zealand (to which it is evidently an occasional wanderer); once by Sir James Hector, in the Gulf of Hauraki, and once by Mr. F. B. Hill, on Little Barrier Island. All doubts as to its being a distinct species have recently been set at rest by the large number of specimens obtained in the Chatham Islands by the collectors of the Hon. Walter Rothschild and Mr. H. O. Forbes. I have examined more than twenty specimens, and find that all of them agree in every respect, so that they cannot be confused with the Auckland-Island species. But when Sir W. Buller published his second edition of the 'Birds of New Zealand' he had, unfortunately, sent back to New Zealand his only specimen from the Chatham Islands, and borrowed from me a specimen which had been obtained by Baron A. von Hügel on the Snares, seventy miles south of the southern extremity of New Zealand. This I had put down as *Gallinago pusilla*, having at that time never seen a Chatham Island specimen. It is very accurately figured and coloured in Buller's second edition; but it proves to be very different from the true *G. pusilla*. The only other example in existence, so far as I am aware, is a second specimen obtained on the Snares at the same time by Baron A. von Hügel, and now in the collection of the Hon. Walter Rothschild.

He adds :—

> "This species may at once be distinguished from its congeners by its much redder hue, and especially by the remarkable fineness and delicacy of its markings, the edgings of the upper plumage and the striation and bands on the lower surface being much smaller, closer, and more distinct. In the other two species (*Gallinago pusilla* and *G. aucklandica*) the abdomen and thighs are whitish, while in this they are thickly barred. In this species the three outer tail-feathers on each side are attenuated, with a white edging; in the others only the two outer pairs of tail-feathers appear to be so attenuated.

The Snares consist of two small islands and several rocks, which extend over a distance of one mile and a half in a direction N.E. by E. and S.W. by W., about 62 miles S.S.W. of Stewart Island, New Zealand. The north-eastern, which is the larger island, is about one mile long and half a mile wide, and is covered nearly all over with trees.

Nestling.—Covered with blackish-brown down varied with lighter.

Fledgling.—The first plumage seems to be more closely striated than in the adult.

Writing of this form, Dr. Sharpe says in the 'Brit. Mus. Catalogue': "This is a well-marked race, a kind of 'Sabine's Snipe' form, as Mr. Rothschild aptly terms it, of *G. aucklandica*. It is the prevalent form in the Snares, but in the Rothschild collection there are also three specimens from the Auckland Islands and one from Antipodes Island."

In the four examples of this rare bird (two males and two females) now in my collection, the sexes are exactly alike in plumage, but the general colouration is much darker in one pair than in the other. The lighter-plumaged birds were obtained at the Auckland Islands, and of these the female has a bill fully 0·25 in. longer than in the male. The darker-coloured birds (which, again, are precisely alike in plumage) came from the Snares, and, if not a distinct species, ought perhaps to be referred to *Gallinago pusilla*.

* Dr. Sharpe formerly considered *G. huegeli* a sub-species of *G. aucklandica*, and he thus distinguished it: ('Cat. B.', xxiv., p. 663): "*Adult male.* Similar to *G. aucklandica*, but altogether darker, and having the under-surface regularly barred with blackish, not only on the flanks, but also on the breast and abdomen. The upper surface is also remarkable for the narrow sandy-buff fringes to the feathers, which have the black sub-terminal spots very small. Total length 9 inches; culmen 2·25, wing 4·3, tail 1·7, tarsus 0·9."

GALLINAGO AUSTRALIS.

(AUSTRALIAN SNIPE.)

Gallinago australis (Latham), **Cheeseman, Trans. N. Z. Inst., vol. xxxi., p. 105.**

In a communication to the Auckland Institute, in August, 1898, Mr. T. F. Cheeseman added this Australian species to our list. The specimen exhibited by him (now preserved in the Auckland Museum) had been shot by Mr. C. C. Sandford on the 26th March previous, in a field near Arch Hill, on the western side of Auckland.

This fine Snipe is to be met with, at the right season, in all suitable localities in Australia; and Mr. Gould found it very abundant in Tasmania in the month of October and on to the following January, frequenting low swampy grounds, lagoons, rivulets and similar situations, and affording excellent sport to the fowler. It is said to breed sometimes in Tasmania, but its true breeding grounds are far north in Formosa and Japan.

CRYMOPHILUS FULICARIUS.

(GREY PHALAROPE.)

Phalaropus fulicarius (Linn.), **Buller, Birds of New Zealand, vol. ii., p. 30.**

No fresh instances of the occurrence of this cosmopolitan species in New Zealand have been added to that recorded by Sir Julius von Haast in 1883; so that Mr. Michael Studholme's specimen in the Canterbury Museum is still unique. It does not follow, by any means, that the species has never since visited our shores, because this is just one of those birds apt to be overlooked amid the teeming flocks of Waders on their hunting grounds.

Prof. Newton has the following remarks in his 'Dictionary of Birds,' p. 711: "The 'Coot-footed Tringa' of Edwards, who, in 1791, showed himself a better judge of its affinities than many others both before and after him, since for a long while some of the best authorities thought the Phalaropes allied to the Coot, whereas they are unquestionably *Limicolæ*, only somewhat modified in accordance with their habit of swimming. . . . . The type is *Phalaropus fulicarius*, commonly known in England as the Grey Phalarope, from the prevalent colour of its winter plumage, which it has generally donned when it visits this country, as it does almost every year. It wears a very different aspect in summer, when the whole of the lower parts are bright bay, while the feathers above are dark brown broadly edged with light rusty, and hence it has in this condition been called the Red Phalarope. It is known to breed in Spitsbergen, in one part at least of Iceland, in Greenland, and presumably throughout Arctic America and Asia, but not on the continent of Europe. Its wanderings in winter seem to be boundless, since its appearance is recorded in Chili and in New Zealand. . . . A more entrancing sight to the ornithologist can hardly be presented than by this and its allied species. Their graceful form, their lovely colouration, and the confidence with which both are familiarly displayed in their breeding quarters can hardly be exaggerated, and it is equally a delightful sight to watch these birds gathering their food in the high-running surf, or, when that is done, peacefully floating outside the breakers."

STILTIA ISABELLA.

(AUSTRALIAN PRATINCOLE.)

Glareola grallaria (Temm), **Buller, Trans. N. Z. Inst., 1898, p. 23.**

The only known instance of the occurrence of this beautiful species in New Zealand was recorded by Mr. William Townson in the 'Transactions of the New Zealand Institute' by means of a letter to myself (vol. xxxi., p. 23). I afterwards had an opportunity of examining and verifying this specimen. Mr. Townson informs me that he heard of a party of five being seen on the beach a few days after this one was shot.

Mr. Townson's communication was as follows: "The bird was first seen by Mr. J. B. McKenzie, an agent for the National Mutual Life Insurance Company, and he came back from the beach for a gun, and on his return shot the bird and brought it to me. I remembered seeing either the bird or a plate of it, and on turning up the 'Royal Natural History' I found an illustration of it, and a pretty full description. The hind-toe, forked tail, and the black line bordering the buff-coloured throat are sufficiently distinctive, the only point omitted in the description being the scarlet margin to the gape. The bird was seen hawking after flies on the beach. It proved to be a male, and the stomach contained the remains of insects and beetles. It seemed quite at home with its surroundings, and I found it in perfect plumage, without any stains of travel or any marks of having been in confinement—so different from an Australian Curlew in my possession, which was shot on the same beach, and which was ragged and frayed out as though it had been beating up against head weather for a week."

Writing of this species, in his 'Birds of Australia,' Mr. Gould says it "possesses several remarkable specific distinctions: the great length of the tarsi and primaries, which, combined with the graceful contour of its body and the small size of its head, render it the most elegant species of the genus that has yet been discovered."

PLEGADIS FALCINELLUS.

(GLOSSY IBIS.)

Tantalus falcinellus, Linn., Syst. Nat., vol. i., p. 241 (1766).

I have added this fine bird to our list on the authority of the following letter from Captain Hutton, under date of May 10th, 1902: "Yesterday I received a specimen of the Glossy Ibis, in winter or young plumage, which had been shot, near Timaru, a day or two before. Unfortunately the neck and breast had been eaten by rats, so that I cannot mount the specimen. I mean by Glossy Ibis, *Plegadis falcinellus*."

Representatives of this genus have a range over nearly the whole of the temperate portions of the Old and New Worlds, extending to Africa, India, and Australia, as well as to South America; so there is nothing extraordinary in a straggler finding its way to New Zealand.

PLATALEA REGIA.
(ROYAL SPOONBILL.)

Platalea melanorhyncha, Reichenb.; **Buller, Birds of New Zealand, vol. ii., p. 144.**

In vol. ii. (p. 144) I gave an account of the occurrence of this fine Australian bird at Manawatu. The specimen, for which I was indebted to the kind assistance of Mr. C. Hulke, is now in the mounted collection of the Colonial Museum.

The only example of which I have heard, since the publication of the 'Birds of New Zealand,' is one of which Mr. Townson informed me, as having been shot on the Buller River, about January, 1892. It was preserved in Dr. Gaze's collection, at Westport; but I am sorry to learn that it has since been utterly destroyed by moths.

I have followed Dr. Sharpe's 'Handlist' in referring this bird to *Platalea regia*, Gould.

ARDEA CINEREA.
(COMMON HERON.)

Ardea cinerea, Linn.; **Buller, Trans. N. N. Inst., vol. xxxi., p. 28.**

This widely-spread species has been met with in all suitable localities throughout the whole of Europe, Africa, and Asia, reaching Japan, many of the islands of the Indian Archipelago, and even Australia. In the latter country it is evidently very rare, for Mr. Gould saw it only once in the course of his explorations. He says: "During my journey into the interior of South Australia, in 1839, I saw a fine example of this bird, but, although I resorted to every possible stratagem in my power to get within shot of it, I regret to say that I was unsuccessful. I have since, however, received a skin direct from New South Wales. Mr. Blyth considers that this Heron is not specifically distinct from the *Ardea cinerea* of India and Europe; and, if this be really the case, the species enjoys a very extensive range over the Old world."

We have now to include New Zealand in the range of this noble bird, Mr. A. Waley having obtained in Auckland the skin of one which was caught on board a schooner off the east coast, the authenticity of its capture being beyond all doubt. It was carefully stuffed by Mr. Spencer, of Queen Street, Auckland; and, on Mr. Whaley's collection becoming dispersed in London, it came into my possession.

It measured: Length, 34 in.; wing from flexure, 17·5 in.; culmen, 4·5 in.; bill, from angle of mouth to tip of lower mandible, 5·6 in.; tail, 6·5 in.

The following 'Crane story,' which illustrates their marvellous power of wing, seems worthy of being placed on permanent record, being a cutting from the *Daily Mail*, whose Cairo correspondent writes:—

> While Sir Rudolf Slatin was engaged with some other officials of the Egyptian Army a day or two ago, an official of the War Office came into the room and handed to him a small metal case resembling a revolver cartridge attached to a ring, which had been found among the Khalifa's effects brought down from Omdurman. The ex-prisoner of the Khalifa was visibly touched at the sight of an object he had last seen under circumstances of an exciting and dramatic nature. The case contained a paper on which was written in French, English, and German, 'This Crane has been bred and brought up on my estate at Ascania Nova, in the province of Tauride, in South Russia. Whoever catches or kills this bird is requested to communicate with me, and inform me where it occurred.—F. R. Falzfein. September, 1892.'
>
> The story of the Russian Crane is familiar to readers of Sir Rudolf Slatin's book. The Khalifa sent for his prisoner one morning and, placing a metal case in his hands, suspiciously asked him to open it and see what it contained. Slatin did so, read the paper enclosed, and replied that the case had evidently been fastened to the neck of a Crane, which had been killed. 'You have spoken the truth,' said the Khalifa more amiably; 'the bird was killed by a Shaifa near Dongola, and the cartridge case was found attached to its neck.' When Sir Rudolf read him the contents of the paper the Khalifa cried out forcibly: 'This is one of the many devices of those unbelievers who waste their time in such useless nonsense. A Mahomedan would never have attempted to do such a thing.' The case and its contents were taken from the prisoner, to be thus returned to him in time as a memento of the days of his cruel captivity.

HERODIAS TIMORIENSIS.

(EASTERN GREAT WHITE HERON.)

Ardea egretta, Gmelin; **Buller, Birds of New Zealand, vol. ii., p. 124.**
Ardea timoriensis, Lesson, Traité, p. 576 (1831).
Maori names: Kotukutuku, syn. with Kotuku.

After much difference of opinion and contention, the specific name to be borne by this bird (one of our rare forms, but numerous enough elsewhere) has been, I think, finally settled.

Our bird is thus distinguished by Dr. Sharpe in the 'Catalogue of Birds,' vol. xxvi.:—

Ad.—Similar to *H. alba*, but with the bill yellow in summer and winter; the train of dorsal plumes not very long, and scarcely reaching beyond the tail; bill beautiful orange; naked space before and behind the eye fine greenish yellow; legs above the knee pale dull yellow, this colour continued down the centre of the inner part of the tarsi; remainder of tarsi and feet black.*

* I examined the type of *Ardea syrmatophora* in Mr. Gould's collection at Philadelphia, presented by Dr. T. B. Wilson to the Academy of Sciences. This bird has a yellow bill with a brownish-black tip, the colour extending upwards for about an inch and a half, and there are abundant dorsal plumes.

There is another example from Australia in the same collection in which the bill is entirely yellow, whilst, on the other hand, it possesses no dorsal plumes.

I have always been contending for the recognition of this Heron as specifically distinct from *H. alba*. After collecting birds in New Zealand for more than forty years, I can only remember one instance (recorded below) of this bird having other than a yellow bill, and in that case the outer half was black. I once received a specimen, shot in the depth of winter, in which the entire bill was of vivid yellow. It had no dorsal plumes, but the feathers composing the mantle were lengthened and somewhat filamentous.

Through the exertions of Mr. St. Clair Liardet, who informs me that he was more than a week in pursuit of the birds before he could get a shot, owing to their extreme shyness, I have received from Collingwood a magnificent pair of the White Heron, or "White Crane," as the colonists prefer to call it. The plumage is of snowy whiteness throughout, and both sexes are furnished with the filamentous dorsal train, which is, however, decidedly fuller in the male bird.

Almost without exception, New-Zealand-killed examples at all seasons of the year have the bill entirely yellow; but a specimen shot at Lake Te Anau in December 1892 (and now in Mr. Melland's possession) exhibits the entirely-black upper mandible which is a regular seasonal character with the Heron in India. This particular bird was in beautiful plumage, with ample dorsal train of filamentous feathers, being apparently a male. Irides very light yellow; soft parts round the eyes bluish-green; legs and feet black; soles yellowish.

On my last visit to Paterson's Inlet (Stewart Island) I saw a beautiful White Heron, which, it was said, had been frequenting that locality for ten or twelve years. We found him perched among, or very near to, a colony of Pied Shags, which were nesting in a tree "rookery"; but the vigilant bird took alarm and sailed away long before our boat had reached the spot, or the Shags, ever on the alert, had shown any sign of uneasiness. We saw him later on in the day, on the other side of the cove, perched high up on a rimu-tree, and looking very conspicuous among the surrounding vegetation: but, although it was fully a quarter of a mile off where our boat landed, the bird took alarm and was off again. I was amused and pleased at the objection of the lad who rowed me out to any attempt being made to shoot the Crane, because, as he put it, "We've seen him here ever so long."

About six months later an ardent collector, after much careful stalking, shot this beautiful Heron, and sent me the skin. I purchased the specimen, but wrote to my correspondent expressing my regret that he had interfered with this particular bird. In his reply he said: "If I had known so much of the history of this Crane as I know now I never would have shot it." It proved to be a female, and at the time it was killed—the month of August—it had no dorsal plumes.*

The mention of this solitary Kotuku in Stewart Island reminds one of a passage in Canon Stack's interesting brochure, already referred to: "In his island home at Rakeiura (Stewart Island) Kana te Pu dreamt that he caught a White Crane, which kicked him in the chest while

* It is satisfactory to know that one's efforts to preserve intact one of the beauty-spots in the Colony meets with appreciation. For example, Mr. George Fenwick, of Dunedin, wrote to me as far back as April 19th, 1899, as follows:—

"Thank you very much for your paper read before the Wellington Philosophical Society last November. There is much of it extremely interesting, and it is pleasant to know that you continue to take so warm an interest in the ornithology of the colony, and that you have numerous correspondents who to some extent aid in the good work. What a pleasure it must be to you to have a delightful country place like Papaitonga, where our beautiful birds can live in security and peace, and fill the air with their melody. Long may the protection they at present enjoy be extended to them! We are fortunate, in Dunedin, in having preserved to us a good deal of bush in the Town Belt. Because of this we are still privileged to hear the little Grey Warbler and the Bell-bird, although the old-time denizens of the suburban bush have gone—the Tuis and Kakas and Pigeons. I even remember a beautiful White Crane on the beach at Dunedin—but that is a long time to look back to. Like the Stewart-Island specimen whose sad fate you tell of, it too was shot."

vainly struggling to get free. Interpreting this dream to mean that he was destined to overcome some famous Ngaitahu warrior, he went to a neighbouring stream to bind the omen, and then, eager to distinguish himself, summoned his followers, and took his departure for the seat of war. In the crisis of the battle, when Rakautauwheke was slaying those to the right and left of him with his taiaha, Kana te Pu, watching his opportunity, sprang upon his shoulders, and held him so firmly that he could not draw his arms back again. He tried in vain to shake him off; but by a sudden movement of his hands he jerked the point of his weapon against the head of his opponent and then, by a violent contortion of the body, succeeded in inflicting a mortal wound, and the 'White Crane' fell dead at his feet."

It is very rarely that this bird is met with now in the North Island. The last occurrence that I am aware of was an example shot by a young farmer at Foxton, in the Manawatu district, about ten years ago.

That excellent observer, Mr. William Townson, of Westport, writes to me: "A White Crane was also shot by a boy, ignorant of its being protected, and came into my possession, and is one of the ornaments of my collection. Another was seen on the mud-flats near the town about six months ago, and then went away to the north, and was for some time to be seen about the flats at Karamea. There are now three of these birds living unmolested on the banks of a small lake near Little Wanganui; and, with the exception of one shot at Hokitika, and an odd one or two seen about the Sounds, I know of no other birds of this species in the district."

It is an interesting sight to watch this stately bird fishing. It wades into shallow water as far as its long legs will enable it, and then it remains perfectly motionless till its prey comes within reach, when it will strike forward with the rapidity of an arrow, seize it with its powerful yellow mandibles, and instantly swallow it. It is quite possible, as suggested by the Duke of Argyll in the case of an allied European species, that the small fish are attracted by the gleaming reflection in the water of the bird's snowy plumage.

NOTOPHOYX NOVÆ-HOLLANDIÆ.

(WHITE-FRONTED HERON.)

Ardea novæ-hollandiæ, Latham; **Buller, Birds of New Zealand, vol. ii., p. 134.**

I have a specimen in my collection which was driven ashore on Centre Island, in Foveaux Strait, after a very heavy gale at sea.

On the mud flats of the Tauranga Inlet, I saw one in the winter of 1892, and I then remembered that I had observed one in exactly the same locality when crossing the bridge seven years before—quite likely the same individual bird. The species is very sedentary and has been known to frequent the same spot for years together.

NYCTICORAX CALEDONICUS.

(NANKEEN NIGHT-HERON.)

Nycticorax caledonicus (Gmelin), **Buller, Birds of New Zealand, vol. ii., p. 139.**

I have added to my collection another New Zealand-killed example of this Night-Heron, differing from those already recorded in being furnished with the beautiful occipital white plumes, rolled in the form of a pointed queue, 7 inches long. This was shot at the mouth of the Catlin River, about a mile from the sea, about August or September, 1888. As already recorded (vol. ii., pp. 139, 140), Sir George Grey, when Governor of the Colony, in 1852, introduced some of these birds from Australia, and liberated them at Wellington, But as early as 1845 the Rev. Mr. Colenso met with one in the Waikato district (*l.c.*, p. 140); and as the bird is only met with rarely, singly, and at long intervals, it is most reasonable to suppose that these are stray visitants from Australia, rather than the descendants of the imported stock. The example described in my first edition, and now in the Colonial Museum, was shot in the neighbourhood of Wellington in 1856, and may have been one of the introduced birds.

ARDETTA PUSILLA.

(LITTLE BITTERN.)

Ardetta maculata (Lath.), **Buller, Birds of New Zealand, vol, ii., p. 136.**
Ardea pusilla, Vieill., N. Dict. d'Hist. Nat., xiv., p. 432 (1847).

On showing Major Kemp Rangihiwinui the specimen of the Little Bittern in the Wanganui Museum, he called it a Karourou, and said that in former years it abounded in the extensive swamps of the Manawatu district. All the hitherto recorded specimens have come from the South Island.

I obtained by exchange from Mr. Drew, of Wanganui, a female example of this Little Bittern, the value being assessed at £11. Curiously enough, on the very next morning I received as a present from Mr. C. A. Barton, of Hokitika, a male of the same species. These are the only specimens of this very rare species in my collection.

This pretty little Bittern has a wide distribution in the Southern Hemisphere. It inhabits Australia, having been obtained in the Gulf of Carpentaria, in East Australia, from Rockingham Bay to Victoria, and in South Australia, besides being met with occasionally in New Zealand.

DEMIEGRETTA SACRA.

(REEF HERON.)

Ardea sacra (Gmelin), **Buller, Birds of New Zealand, vol. ii., p. 129.**

On the beautiful cocoa-nut island of Wakaya, where I spent a week with Captain Langdale, R.N., during my last cruise through the coral islands of the Western Pacific, I saw, and ultimately secured, a snow-white example of this species, which is known to be dimorphic. It was paired with a bird in the ordinary bluish slate-coloured plumage, which also in the end fell into my hands.*

Professor Moseley writes ('Challenger Naturalist,' p. 291): "A small Heron (*Demiegretta sacra*) wades about on the coral reefs at Tonga, and catches small fish, and is also to be seen frequently inland all over the island. This bird changes its plumage from pure white to uniform grey, and all stages of parti-coloured plumage were to be seen during our visit. Contrary to the usual rule, the bird is white when young, and dark in the mature stage. Hence the ancestors must have been white, and the race is assuming a darker plumage for protection."

Dr. Sharpe ('Catalogue of Birds,' vol. xxvi., p. 141) writes: "The white streak down the throat is often absent or reduced to a few spots. It appears to be absent equally in quite young birds as well as in old ones also, and it may be the result of inherent melanism in the species. The white form is exactly similar in size to the grey form, and, when adult, has the same ornamental plumes. In the Pacific Islands the two forms appear to inter-breed, and produce white young ones mottled or streaked with slaty-grey. I have been unable to recognise any of the many forms into which the Reef Heron has been subdivided by naturalists. Some birds are larger, as may be seen by the measurements of the tarsi given in detail below, and these larger birds have a slightly longer wing and a heavier bill, but no specific distinctions can be founded on these variations, which are very slight."

Mr. Pycroft writes: "I have obtained its eggs at the Black Rocks in the Bay of Islands. The nest is loosely built, and is composed of twigs and rushes placed in some almost inaccessible chasm."

Young bird.—(September—first moult.) Plumage ashy-brown, changing to cinereous, the new feathers showing up brightly against the old; very narrow white streak on throat and only about two inches in extent; no appearance of dorsal plumes. Bill dull brown, tinged with yellow; legs and feet dull green, the soles yellowish; bare space around the eyes yellowish-green; irides yellow. This bird was shot in a swamp by my son Percy, at Kaikoura, in the South Island.

If Dr. Sharpe is right in bringing all these forms together under one head, the species has a wide geographic range, including the coasts of Burma and the islands in the Bay of Bengal, the Malay Peninsula and adjacent islands, on to Australia, New Zealand and the Pacific, and extending north to the islands of the Bay of Corea.

* "Mr. Gould mentions that some specimens of this Heron have the neck wholly white. One such bird is in the Museum collection, and I think it probable that this may be the dimorphic form of the species." (Sharpe, 'Cat. Birds, Brit. Mus.,' xxvi., p. 112.)

BOTAURUS PŒCILOPTILUS.

(BLACK-BACKED BITTERN.)

Botaurus pœciloptilus (Wagler), **Buller, Birds of New Zealand, vol. ii., p. 141.**

Five and thirty years ago the Bittern was a common enough bird on the west coast of the Wellington province. At that time the fine district now traversed by the Wellington-Manawatu railway line was an almost continuous chain of low-lying swamps and marshes, where "the boom of the lonely Bittern" was one of the most familiar sounds. From the Uruhi swamp, near Waikanae, I obtained a never-failing supply of fine specimens, always generously assisted thereto by my good friend the old Waikanae whaler, Bill Jenkins, who was himself a keen sportsman, and loved to flush a Bittern; for the bird never escaped his sure aim, although even at that time he was quite an old man. I remember on one occasion shooting an adult male Bittern on the border of this swamp, and the wounded bird, with a broken wing, nearly deprived me of one of my eyes by a well-directed thrust of his stiletto-like bill. I had been warned by Jenkins, who was an expert, but this personal experience made me far more careful afterwards. Now, nearly all this country is covered with smiling farms, supporting contented homes, and old Jenkins sleeps with his race in the picturesque churchyard at Otaki. What Bitterns are left have retired to the great Makererua swamp, further up the coast; but this, too, is rapidly yielding to a great system of drainage. A few, as already stated, have taken refuge with me at Papaitonga, and these will receive all the protection they need. Through inadvertence one was shot on the wing when crossing an arm of the lake, but this is not likely to happen again.

Under date of August 15th, 1903, Mr. W. W. Smith, of Ashburton, sends me the following note:—

> It will afford you pleasure when I state that the Bittern (*Botaurus pœciloptilas*) continues plentiful, notwithstanding the very rapid advancement of settlement. In the months of November and December these birds inhabit the sedge and cress-choked creeks entering the Hakatore, or Ashburton River, on the open plains, subsisting on the young fry of several species of introduced trout and the native goby. A friend of mine, when out shooting in April last, shot a Bittern on the river-bed whose stomach contained a young trout, over three inches long, together with a mass of half-digested watercress (*Nasturtium officinale*). All specimens that have passed through my hands for several years appeared to be subsisting chiefly on cress, as the vegetable part of their diet. In April and May they become prodigiously fat, but the flesh is strong-flavoured, in whatever style it may be cooked.

In the Tring Museum there is a specimen several shades lighter than ordinary ones, thus showing a tendency to albinism.

Mr. T. W. Kirk has described a specimen from Foxton, in the Manawatu district, with a large white patch on each shoulder and on the back of the neck, the remainder of the plumage being of the normal colour.

Mr. Hamilton has recorded that, many years ago, when shooting at Tongoio, in the Hawke's Bay district, he put up as many as sixteen in one day. Since that time the bird has become very scarce in all the parts of the country where drainage operations have been carried on.

The late Mr. Robson, in a letter to me, said: "I remember, one summer in Hawke's Bay, shooting on the same day and in the same locality two very fine Bitterns which were, to all

appearance, fishing by a stream. On opening them, however, to find out what kind of fish they were catching, I found the crop of each crammed with grasshoppers and nothing else."

The young differs from the adult in its smaller size and much paler plumage; the blackish-brown on the front and sides of the neck is entirely absent, there being in place thereof a broad central irregular stripe of cinnamon-brown; and the soft spreading plumage is of a pale-tawny colour, with numerous transverse **V**-shaped markings of pale cinnamon-brown; the brown lanceolate markings on the breast and sides of the body are paler than in the adult, and the plumage of the upper surface of the body is altogether lighter and more largely suffused with tawny-yellow or buff.

This species, formerly so abundant on the west coast of Wellington, is getting scarce, owing to the draining of the swamps, as the inevitable result of systematic settlement.

To show how varied is the bill of fare of the Bittern, Mr. S. H. Drew, the curator of the Wanganui Museum, records that one, dissected by him, contained in its stomach a fully-feathered *Zosterops*, an (introduced) Australian frog, five locusts, a large spider, two common sand-lizards, and the remains of a small fish. From the stomach of another he had extracted seven mice. It will be seen, therefore, that this bird is useful to the husbandman.

Mr. Guthrie-Smith,* confirming and commenting upon my account of the manner in which the Bittern stalks through the shallow water, raising its foot high at every step, as if deliberately measuring the ground, suggests that the object of this is not to dim the mirror of water, and thereby dull the vision of fish. This is highly probable, and the green limbs of the bird, by their assimilation to the reed-stems, no doubt aids it in the pursuit of its prey. We know, from analogy, that even the slightest degree of protective resemblance is of practical advantage to a species in the great struggle for existence, which never for a moment ceases. It would be easy to give many familiar illustrations of this.

I have already described (vol. ii., p. 143) a nest of this species in the Canterbury Museum; but as the taking of a Bittern's nest is a somewhat unusual occurrence, I have much pleasure in reproducing here Mr. P. E. Cheal's account of one containing five eggs, which he discovered in a swamp at Whakahara, in the Piako district:

> On Wednesday, August 30th, when chaining along the boundary of the Takapau-Rerekau Block, and about one mile and a half west of the Waitoa River and three miles east of the Piako River, my chainman's son walked a long distance from the party and stumbled over the nest, very nearly falling upon the Bittern, which rose and flew away. On examining the nest, I was pleased to find five eggs in it. The nest was quite exposed, being situated in a small toetoe tussock not four inches above the level of the swamp-water. It was composed of a few layers of dry rushes, laid across one another, without any attempt at nest-making. Interspersed with the rushes was some fine down, but whether from the Bittern or from some other bird I cannot say.

A nest of this recluse species lately examined by me, at Wellington, was formed entirely of dry grass, loosely packed together.

* Trans. N. Z. Inst., xxviii., p. 375.

(End of Volume I.)